ORDER

6690.6

MAINTENANCE OF VOICE SWITCHING AND CONTROL SYSTEM TRAINING AND BACKUP SWITCH (VTABS)

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FOREWORD

1. PURPOSE.

This handbook provides guidance and prescribes technical standards and tolerances, and procedures applicable to the maintenance and inspection of the Voice Switching and Control System (VSCS) Training and Backup Switch (VTABS) facilities. It also provides information on special methods and techniques which will enable maintenance personnel to achieve optimum performance from the equipment. This information augments information available in instruction books and other handbooks, and complements the latest edition of Order 6000.15, General Maintenance Handbook for Airway Facilities.

2. DISTRIBUTION.

This directive is distributed to selected offices and services within Washington headquarters, the William J. Hughes Technical Center, the Mike Monroney Aeronautical Center, regional Airway Facilities divisions, and Airway Facilities field offices having the following facilities/equipment: VTABS.

3. MAINTENANCE AND MODIFICATION PROCEDURE.

a. The Order 6000.15, this handbook, the applicable equipment instruction book, and other applicable handbooks shall be consulted and used together by the maintenance technician in all duties and activities for the maintenance of the VTABS. These documents shall be considered collectively as the single official source of maintenance policy and direction authorized by the Airway Facilities Service. References located in the appropriate paragraphs of this handbook entitled: Chapter 3, Standards and Tolerances; Chapter 4, Periodic Maintenance; and Chapter 5, Maintenance Procedures, shall indicate to the user whether this handbook and/or the equipment instruction book shall be consulted for a particular standard, key inspection element or performance parameter, performance check, maintenance task, or maintenance procedure.

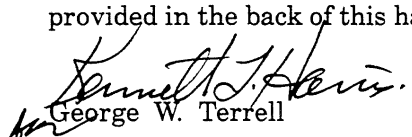
b. The latest edition of Order 6032.1, Modifications to Ground Facilities, Systems, and Equipment in the National Airspace System, contains comprehensive policy and direction concerning the development, authorization, implementation, and recording of modifications to facilities, systems, and equipment in commissioned status. It supersedes all instructions published in earlier editions of maintenance technical handbooks and related directives.

4. FORMS LISTING.

In addition to the forms required by Order 6000.15, use FAA Form 6000-8, Technical Performance Record to record the performance of VTABS. The form is available under National Stock Number (NSN) 0052-00-686-0001, in units of pads, 50 sheets per pad.

5. RECOMMENDATIONS FOR IMPROVEMENT.

This handbook is under configuration management control as defined in the latest edition of Order 1800.8, National Airspace System Configuration Management, and NAS-MD-001, National Airspace Configuration Management Document. Any changes to the baseline document or request for deviation from national standards shall be processed through the National Airspace System (NAS) Change Proposal (NCP) process. Copies of FAA Form 1800-2, NAS Change Proposal, are provided in the back of this handbook.



George W. Terrell
Program Director for Operational Support

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CHAPTER 1. GENERAL INFORMATION AND REQUIREMENTS

1. OBJECTIVE.

This handbook provides the necessary guidance, to be used in conjunction with information available in instruction books and other handbooks, for the proper maintenance of the Voice Switching and Control System (VSCS) Training and Backup Switch (VTABS).

2. SAFETY.

Personnel should observe all pertinent safety precautions and Electrostatic Discharge (ESD) handling procedures when working on the equipment. Refer to Order 6000.15 for guidance.

3. AIRCRAFT ACCIDENT.

a. The National Airspace System (NAS) Operations (AOP) and Operational Support (AOS), along with the onsite Airway Facilities (AF) organizations are responsible for the evaluation and documentation of the technical performance of the facilities that were, or might have been, involved in an aircraft accident. This requires that facility operational data be obtained and recorded in the maintenance logs and meter reading forms. These recorded events are official documents and may be used by an aircraft accident/incident investigation board in the determination of the facility operational status at the time of the accident. To avoid any misinterpretation of the data, the entries shall be complete, clear, concise, and accurate. The latest edition of Order 8020.11, Aircraft Accident and Incident Notification, Investigation, and Reporting, should be consulted for details.

b. Minimum data must be obtained and recorded for any Air Traffic Control (ATC) functionality involved in an aircraft accident. The following data must be extracted from the system in support of the accident/incident investigation ten minutes prior to the time of the reported incident and ten minutes after the reported incident:

(1) System Event log data — tape/diskette backup.

(2) Exception report file data tape/diskette backup.

c. If any system component failed or transitioned from the In Service state to Out Of Service (OOS) state during the ten minute window prior to or after the estimated time of an incident, that component will be placed in the In Service state, verified with an operational air to ground check, and system recertified.

d. Certify the maintenance and facility log entries. Have another technician or the supervisor also certify the log entry.

e. If a check of the facility or VTABS equipment indicates that primary power was distorted or interrupted, record the events. If the power has been determined to be a factor, then verify that the current condition of the power source is within acceptable limits.

4. COORDINATION.

Maintenance activities shall be closely coordinated at all times with Air Traffic Operations (ATO) personnel in order to prevent unanticipated interruption of services. Certified electronic technicians assigned to the facility, where the equipment is installed, shall be responsible for maintaining the equipment. Cognizant ATO personnel shall be advised immediately of equipment failure, restoration to service, or out of tolerance conditions. ATO personnel shall be advised of any situation that may adversely affect equipment operation. Air traffic (AT) personnel are expected to release the equipment to maintenance in a timely manner when requested to do so.

5. PRECAUTIONS WHEN USING TEST TONES.

When making checks on any receiving channel, extreme care should be exercised to avoid applying test tones in excess of those prescribed by the procedures of this directive. Annoyance or damage to operating personnel hearing may occur if the test tones are delivered to controller positions or are intercepted by other maintenance personnel at other points in the system.

6. FLIGHT INSPECTION.

No flight inspections are required to maintain the VTABS.

7. TECHNICAL INSPECTION.

Formal inspections are among the more effective management controls for assuring the required quality level of maintenance work and of equipment and system performance. See Order 6000.15, and the latest edition of Order 6040.6, Airway Facilities NAS Technical Evaluation Program, for further details.

8. PERIODIC MAINTENANCE.

Maintenance personnel shall follow the tasks and schedules provided in Chapter 4, Periodic Maintenance, which includes the minimum essential preventive maintenance activities and the frequency with which they shall be performed to meet the minimum performance standards for the VTABS. When replacing Line Replaceable Units (LRU), record bar codes in accordance with the Bar Code System User Manual for the Voice Switching and Control System (VSCS), 184609.

9. CERTIFICATION REQUIREMENTS.

Refer to Order 6000.15, for general guidance on the certification of systems, subsystems, and equipment. Refer to appendix 1 of the latest edition of Order 6470.29, Maintenance of En Route Air-to-Ground Communications Facilities, for the specific requirements applicable to the certification of Air Route Traffic Control Centers (ARTCC) Air-to-Ground (A/G) communication functionality of the VTABS. Certification is periodic verification, with documentation, that a system or service works as advertised within the prescribed handbook tolerances or limits. VTABS provides necessary backup communication between pilots and ATC during aircraft operations. System level certification is required for the VTABS A/G functionality and associated A/G equipment.

10. AUTOMATION SERVICE REPORTING TERMINOLOGY.

This paragraph conveys common definitions for use by the AF headquarters and field personnel in reporting facility performance at a Federal Aviation Administration (FAA) national level. Computer service interruptions and other equipment deficiencies have not been uniformly reported, and local data has not consistently agreed with national performance reports. Various reporting facilities have sometimes used the same reporting terms in different ways. These facilities have reported scheduled start-overs or outages that others would have reported as unscheduled. Therefore to assure that all automation service interruptions are reported and interruption data can be correlated, definitions in the latest edition of Order 6040.15, National Airspace Performance Reporting System (NAPRS) and Maintenance Management System (MMS), shall be used.

11. REFERENCES.

a. The latest editions of the following publications are referenced in this handbook:

(1) 1800.8, National Airspace System Configuration Management.

(2) 6000.15, General Maintenance Handbook for Airway Facilities.

(3) 6032.1, Modifications to Ground Facilities, Systems, and Equipment in the National Airspace System.

(4) 6040.6, Airway Facilities NAS Technical Evaluation Program.

(5) 6040.15, National Airspace Performance Reporting System.

(6) 6470.29, Maintenance of En Route Air-to-Ground Communications Facilities.

(7) 6500.9, Maintenance of Backup Emergency Communication (BUEC) Facilities.

(8) 6650.4, Maintenance of Voice Frequency Signaling System (VFSS) Equipment.

(9) 8020.11, Aircraft Accident and Incident Notification, Investigation, and Reporting.

(10) TI 6030.1, User's Manual for the Maintenance Management System (MMS).

(11) TI 6690.25, VTABS System Operation and Maintenance Manual (VSOM).

(12) TI 6690.24, Master Instructor, Data Entry Operator (DEO), and Supervisor (MIDS) Manual.

b. A listing of related publications useful to technical personnel may be found in appendix 1 of Order 6000.15, and section 1 of TI 6690.25.

12.–19. RESERVED.

CHAPTER 2. TECHNICAL CHARACTERISTICS

20. PURPOSE.

The VTABS provides AT controller training, and A/G connectivity between ATC and aircraft pilots. VTABS also provides backup ground-to-ground (G/G) intercom (IC) and interphone (IP) voice connectivity between AT controllers within ARTCCs, Terminal Radar Approach Controls (TRACON), and controllers in adjacent facilities. VTABS provides AT controllers with an independent path for voice communications in the event that VSCS is unavailable for use due to power failure, equipment failure, hardware/software maintenance, or scheduled preventative maintenance (PM).

21. FUNCTIONAL DESCRIPTION.

a. The VTABS is an integrated, computer-controlled voice switching system that provides training and backup communications for ARTCC facilities. There is no resource sharing between the Backup Subsystem and the Training Subsystem. VTABS consists of two fully independent subsystems in a common control rack configuration. The VTABS Backup Subsystem provides backup communications for designated critical controller positions. The VTABS Training Subsystem provides AT controller training. A block diagram of VTABS is shown in figure 2–1.

b. The VTABS Backup Subsystem consists of eight hardware subsystems, and six computer software subsystems. The VTABS Training Subsystem consists of six hardware subsystems and four computer software subsystems.

c. Although the Backup Subsystem and the Training Subsystem operate independently of each other, they do share some common hardware enclosure cabinets and equipment racks. The VTABS incorporates a Harris 20–20 switch, (A/G and G/G switching subsystem), Position Electronics Modules (PEM) for controlling and interfacing the ATC peripheral end-user equipment to the Switching Subsystem, Workstations, System Monitor and Control (SMC), Power Subsystem with Uninterruptable Power Supply (UPS), and VSCS Cutover Switch Subsystem (CSS). Typically, one critical position in each sector is designated as being backed-up by VTABS.

d. The A/G Switching function provides connectivity between ATC positions and Ultra High Frequency (UHF)/Very High Frequency (VHF) transmitters, receivers, and BUECs. The A/G function performs the switching operation between AT controller positions and RADIO and BUEC interfaces. It receives Squelch Break (SQB) and audio signals from selected radios and routes them to designated positions. The A/G Switch function receives configuration data from the SMC, via the System Local Area Network (LAN), for the purpose of A/G communication configuration control. The Switching Subsystem in turn, provides status data to the SMC via the System LAN. It also provides the processing and interface functionality required to support the A/G Switch Control.

e. The G/G switching function provides the connectivity between ATC positions and other ATC positions and trunks. The G/G switching function receives configuration data from the SMC for the purpose of assignment of G/G communications functions. The G/G switching functions include IC and IP call types, Indirect Access (IA), Direct Access (DA), voice call modes, and various call features.

f. The VTABS Backup and Training Subsystems use PEMs which are similar in functionality to the VSCS Electronic Modules (VEM), and provides equivalent ATC functionality. Identical Computer Human Interface (CHI) operations, visual and tactile feedback are provided through the VSCS console equipment (VCE) user interface devices, which include two VSCS display modules (VDM), two dual jack modules (DJM), two loudspeakers (LS), the VSCS IA keypad (VIK), and the footswitch.

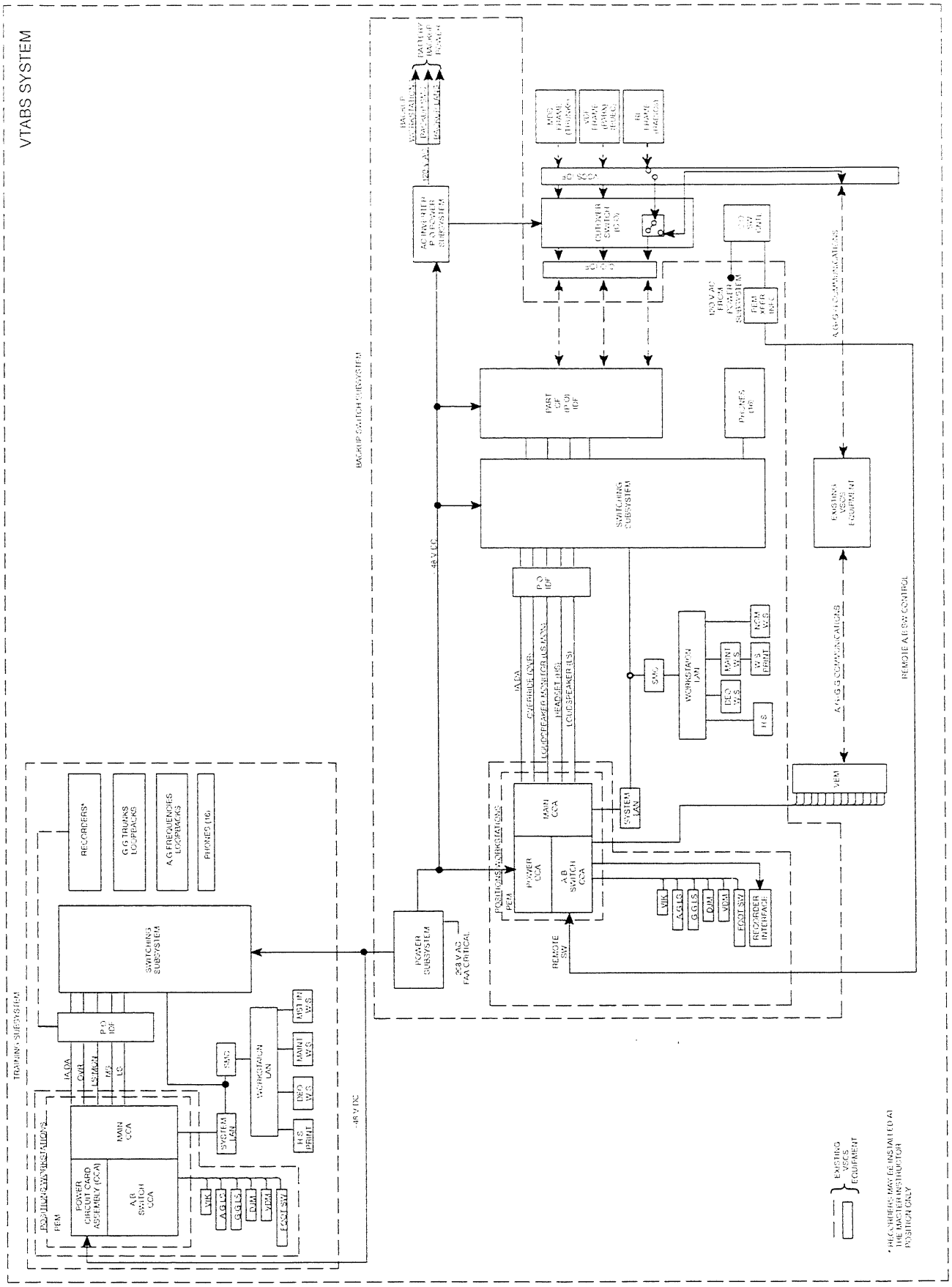


FIGURE 2-1. TRAINING AND BACKUP SWITCH BLOCK DIAGRAM

g. The VTABS Power Subsystem converts 208 Volts alternating current (V ac) from critical power into −48 Volts direct current (V dc). The −48 V dc is output to the Training PEMs, Backup PEMs, Switching Subsystem, Backup Intermediate Distribution Frame (IDF), and direct current/alternating current (DC/AC) inverters. The −48 V dc is inverted to 120 V ac by the DC/AC inverters and output to the Backup Subsystem workstations, Backup SMC, Backup LANs and Cutover Switch. Status of the power subsystem is reported and displayed only on the Backup Subsystem workstations. Battery backup provides an uninterrupted power source, to the Backup Subsystem only, for a minimum of 20 minutes if an FAA Critical Power outage occurs. In the event of a power outage, backup power to the Training Subsystem is removed via a contactor in the power subsystem. A block diagram of the Power Subsystem is shown in figure 2−2.

h. The System LAN is a 10BASE−T topology. Twelve (12) port and twenty four (24) port fan-out hubs provide connectivity between the Backup position PEMs, SMC, and Switching Subsystem. The hubs are mounted in the VTABS IDF, 22A4, and the LAN Hub rack, 23A1. The System LAN carries configuration control, and status data between PEMs, SMC, and the Switching Subsystem. The LAN function provides an Institute of Electrical and Electronic Engineers (IEEE) 802.3 standard compatible bus interface. The Workstation LAN hardware is the same as the System LAN.

22. VTABS BACKUP SUBSYSTEM.

a. The Backup Subsystem is comprised of the following equipment units:

CSS and IDF	Unit 8
20−20 Switch Subsystem	Unit 19
PEM	Unit 21
IDF (Backup)	Unit 22
System and Workstation LAN	Unit 23
SMC	Unit 24
Workstation	Unit 25
Power Subsystem	Unit 27

b. The Backup Subsystem was developed to allow for access to facility-defined critical A/G and G/G communications that is independent of the VSCS. The Backup Subsystem provides AT controllers with near instantaneous voice communications availability over an independent path after a switchover to A/G and G/G communication resources. This happens in the event that VSCS is unavailable for use due to power failure, system failure, or scheduled hardware and/or software maintenance activities.

c. The Backup Subsystem is transitioned online when VSCS is not available for controllers to access and control critical VHF and UHF A/G radios and G/G trunks. The VTABS Backup Subsystem is pre-configured with position maps which enables communications resources to be allocated and available to air traffic controllers immediately following switchover from VSCS to VTABS. During switchover to VTABS, all active A/G and G/G communications that are in progress are disconnected. The controller will be required to select/deselect all A/G frequencies and associated sites in order to restore communications. Thereafter, VTABS will retain these settings through additional VSCS/VTABS switchover transitions until the air traffic controller or maintainer changes them, or specific VTABS reconfiguration procedures are performed.

d. Up to 50 positions, 126 G/G trunks, and 190 A/G frequencies are available following switchover to VTABS. Refer to table 2−1 for a list of VTABS trunk types. Critical A/G frequencies and G/G circuits are associated with the appropriate VTABS position(s) using pre-defined maps. The Backup Subsystem does support PABX, but VSCS PABX circuits are not going to be backed up. The VTABS power subsystem has a reserve power supply that will permit continuous operation of the Backup Subsystem for a minimum duration of 20 minutes independent of existing facility power constraints.

e. In the Backup Subsystem the PEM and VEM are connected to VCE user interface devices in the Display System Replacement (DSR) console via an A/B switch circuit card in the PEM. Refer to Figure 2−3, Backup Subsystem PEM Interfaces.

f. During normal operations, the VCE peripheral devices are connected to the VSCS VEM via the A/B Switch Circuit Card Assembly (CCA) located within the PEMs. The A/G and G/G communications are routed to the VSCS IDF, to the VSCS Cutover Switch and output as trunks, BUEC, and radio data. When a bulk transfer occurs, the VSCS Cutover Switch outputs a switchover signal to the PEMs A/B CCA. Upon receiving the switchover signal, the A/B CCA switches the VCE peripherals inputs from the VSCS VEMs to the VTABS PEMs. The switching action of the A/B CCA moves the critical VSCS VCE peripherals from the VSCS and routes them to the Backup Switch for processing.

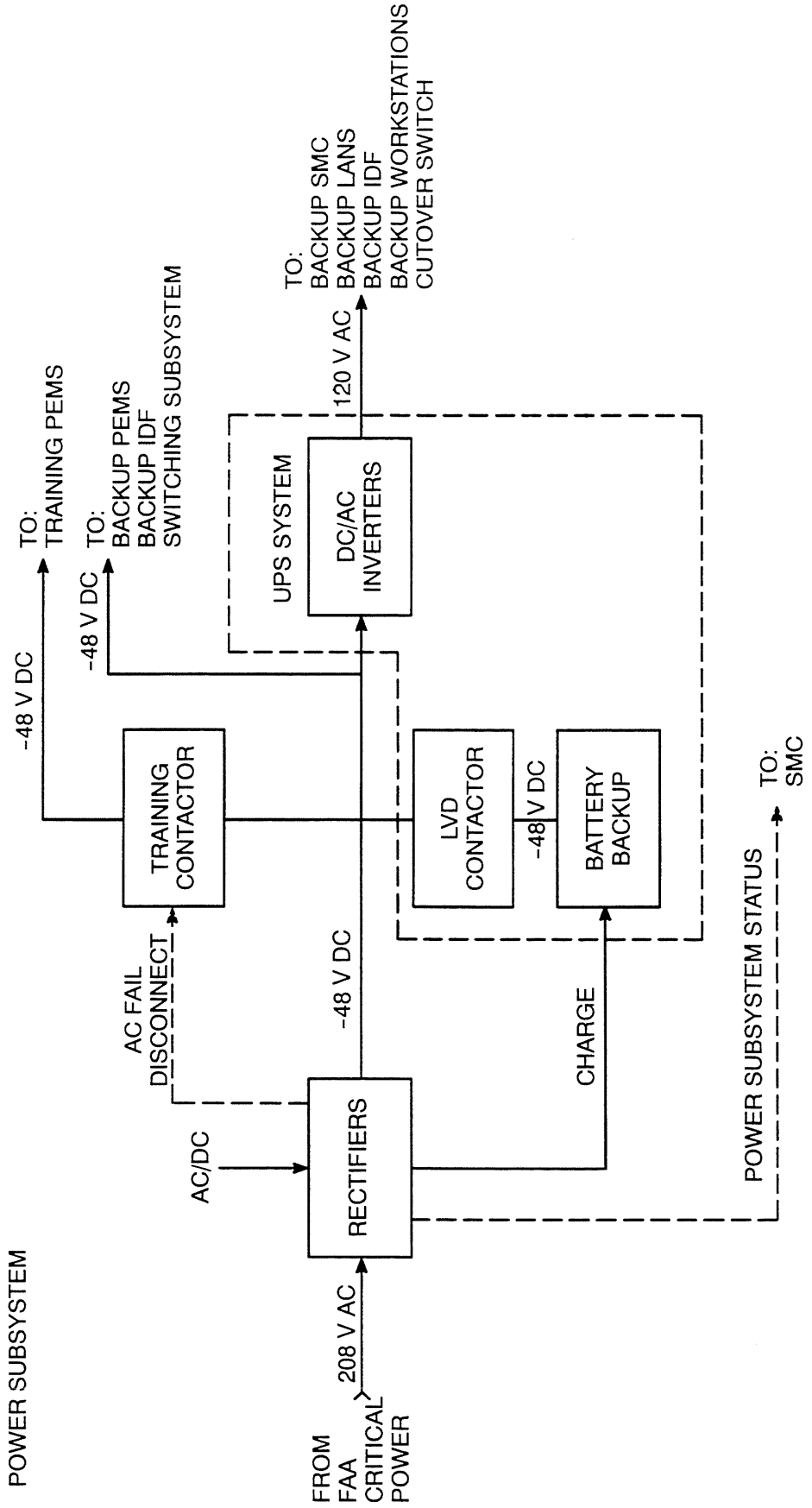
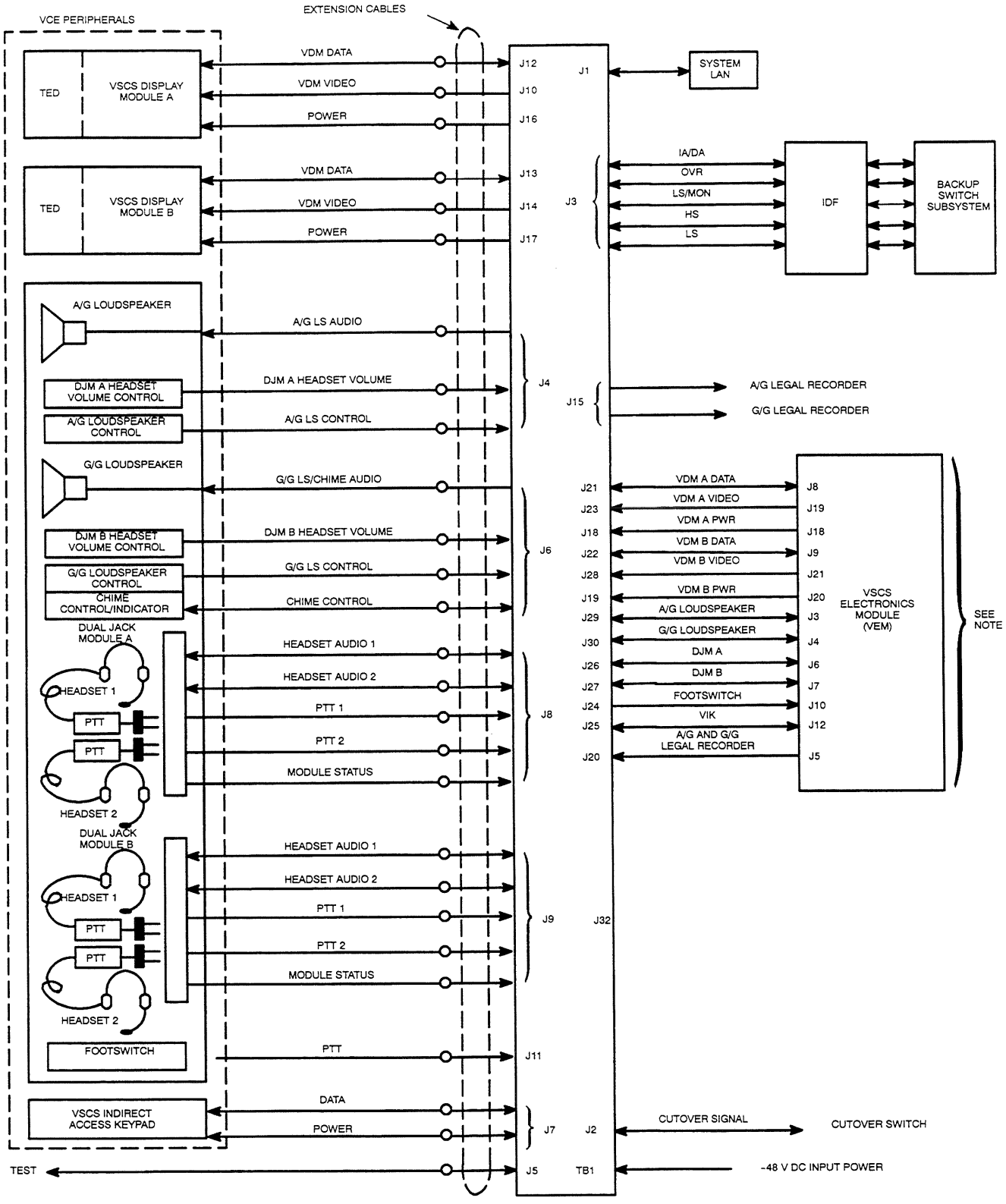


FIGURE 2-2. VTABS POWER SUBSYSTEM BLOCK DIAGRAM



NOTE: REFER TO THE VSCS SYSTEM MAINTENANCE MANUAL FOR VEM CONNECTIONS TO VSCS.

FIGURE 2–3. VTABS BACKUP SUBSYSTEM PEM INTERFACES

TABLE 2-1. VTABS TRUNK TYPES AND SIGNALING METHODS

Type	Description	Outbound Signaling	Inbound Signaling	Uses
3 (2W)	Manual ring with loop signaling.	Automatic ring-down or voice page.	Ring signaling.	VTABS position to a special phone in same facility.
3 (4W)	Manual ring with tone-burst signaling.	Automatic ring-down or voice page. Manual re-ring.	Automatic ringdown.	Manual ring call. Called position must have DA for trunk.
4	SS1 or SS4, 4W 2600/2400 Hertz (Hz).	Voice page signaling outbound.	Dial signaling inbound.	Multi-point communication. SS-1=2 digit, SS-4=3 digit.
5	SS1 or SS4, 4W 2600/2400 Hz.	Dial signaling outbound.	Dial signaling inbound.	Multi-point communication. SS-1=2 digit, SS-4=3 digit.
4/5	SS-1 or SS-4, 4W 2600/2400 Hz.	Voice page, or dial signaling outbound.	Dial signaling inbound.	Multi-point communication. SS-1=2 digit, SS-4=3 digit.
6	Central Office/PABX extension.	Selective dial outbound.	Non-selective dial inbound.	VTABS position to a central office, or PABX.
7	Tie Lines 4W Single Frequency (SF) signaling.	Dial signaling outbound.	Dial signaling inbound.	VTABS position to a VTABS position in another facility.
8	Local Dial 2W loop start.	Non selective outbound.	Selective inbound.	VTABS position to local facility/airline office.
9	Voice Call 4W voice detection signaling.	Voice page signaling outbound.	Voice page signaling inbound.	Commonly known as "voice" or "shout" line. Calls cannot be put on hold or forwarded.

g. VSCS to VTABS switchover can be initiated from five different locations:

(1) Software switchover from the Cutover Switch remote terminals.

(2) Bulk Transfer Switch.

(3) Master Central Processing Unit (CPU) switch in the CSS cabinet (8A1).

(4) Cutover Switch "G" modules.

(5) PEM A/B Switch (peripherals only).

h. Manual switchovers, at the PEM or the Cutover Switch 'G' modules, do not include a switchover of G/G and A/G resources. After the switchover to VTABS has been performed, the PEM performs the same functions as the VEM. Power for the PEMs and associated VSCS interface devices is provided via the VTABS power subsystem, which is independent of the DSR console power source.

i. The primary system, VSCS, is switched to the VTABS Backup Subsystem and return by a single bulk transfer switch. It is possible to manually transfer single or multiple VCEs (VDM, VIK, DJM, LS, footswitch) and communication resources to VTABS for test and/or maintenance.

j. The CSS is permanently installed at each site and is used to switch the critical positions' resources, (i.e., A/G radios, and G/G trunks) to either VSCS or to

the VTABS Backup Subsystem. In the event of a catastrophic VSCS failure, VTABS can be placed instantaneously online via a single Bulk Transfer command in order to provide access to critical facility positions, trunks, and radio frequencies until such time that VSCS operations can be restored. All critical positions, trunks, and radios are switched over during the Bulk Transfer. Upon switchover, a CHI message is displayed at both VDMs at each VTABS backed up position (up to a total of 50 positions). Following the restoration of the VSCS system, the critical positions, trunks, and radios can be switched back to VSCS via a single Bulk Transfer command from the CSS.

k. Manual cutover of individual PEMs is made by a switch on the PEM front panel. This switch switches only the console peripheral devices between VSCS and VTABS. The radio and trunk circuit assignments are not switched by this action.

l. VTABS provides two independent SMC subsystems; one for the Backup Subsystem, and one for the Training Subsystem. Both SMC subsystems are configured identically. The functionality that is provided by the SMC is similar to that of the VSCS CS, (Tandem Computer), which provides the monitor and control functionality for the VSCS. This includes the performance of supervisory, data entry, maintenance, and monitoring functions. The VTABS Backup and Training Subsystem workstations are connected to their respective SMC via LANs. The SMC interfaces with the system LAN and the workstation LAN via Type T Baby N Connectors (BNC) that are connected to the buses.

23. VTABS TRAINING SUBSYSTEM.

a. The Training Subsystem is comprised of the following equipment units:

20–20 Switch Subsystem	Unit 19
PEM	Unit 21
IDF (Training)	Unit 22
System and Workstation LAN	Unit 23
SMC	Unit 24
Workstation	Unit 25
Power Subsystem	Unit 27

b. The Training Subsystem is designed to assist in the training of AT controllers under the supervision of an instructor by providing simulated A/G and G/G communication paths within a working AT environment.

c. Simulated A/G frequency/site communications are provided via loopbacked Grim Corporation Equipment (GRIM) radio interface cards, and simulated G/G calls are provided with loopbacked SF/Voice Operated Detection (VOX) II interface cards. Instructor positions can also establish independent communications via the direct distance dialed (DDD) network using telephones.

d. The Training Subsystem is designed to provide a fully independent functional training capability in the Dynamic Simulation (DYSIM) laboratory. The Training Subsystem supports a maximum of 49 Student/Pilot positions, 1 Master Instructor position, and up to 24 workstations. The Training Subsystem allows for up to 24 student positions to interact with 24 Ghost pilot positions and 1 Master Instructor position. Workstations are used for the DEO, Master Instructor, and Maintainer.

e. The Training Subsystem provides AT controllers with a subsystem that uses the actual VCE peripherals via the VTABS PEMs for training.

f. In the Training Subsystem, the PEM provides the only interface between VCE end user devices and simulated A/G and G/G resources. (VEMs are not used by the Training Subsystem.) The PEM interfaces VCE peripheral equipment to the Student/Pilot, Master Instructor, and the maintenance positions. The Master Instructor position can be configured to a maximum of 24 voice recorders that interface the Training Control Shelf. Refer to Figure 2–4, Training Subsystem PEM Interfaces.

g. The Training Subsystem simulates all A/G radio functionality except for BUEC and cross-coupling. It trains controllers to access and control VHF and UHF radios for A/G communications and G/G trunks for voice communications. It also provides for simulated IP calls for the following trunk types: Type 3 tone burst (manual and automatic ring); Type 5 selective signaling (SS1/SS4); Type 7; and Type 9 voice calls. The Training Subsystem does not support commercial telephone access.

h. The Training Subsystem does not have direct access to VSCS or to the VTABS Backup Subsystem. Training will not interfere with the operation of either the VSCS or the VTABS Backup Subsystem.

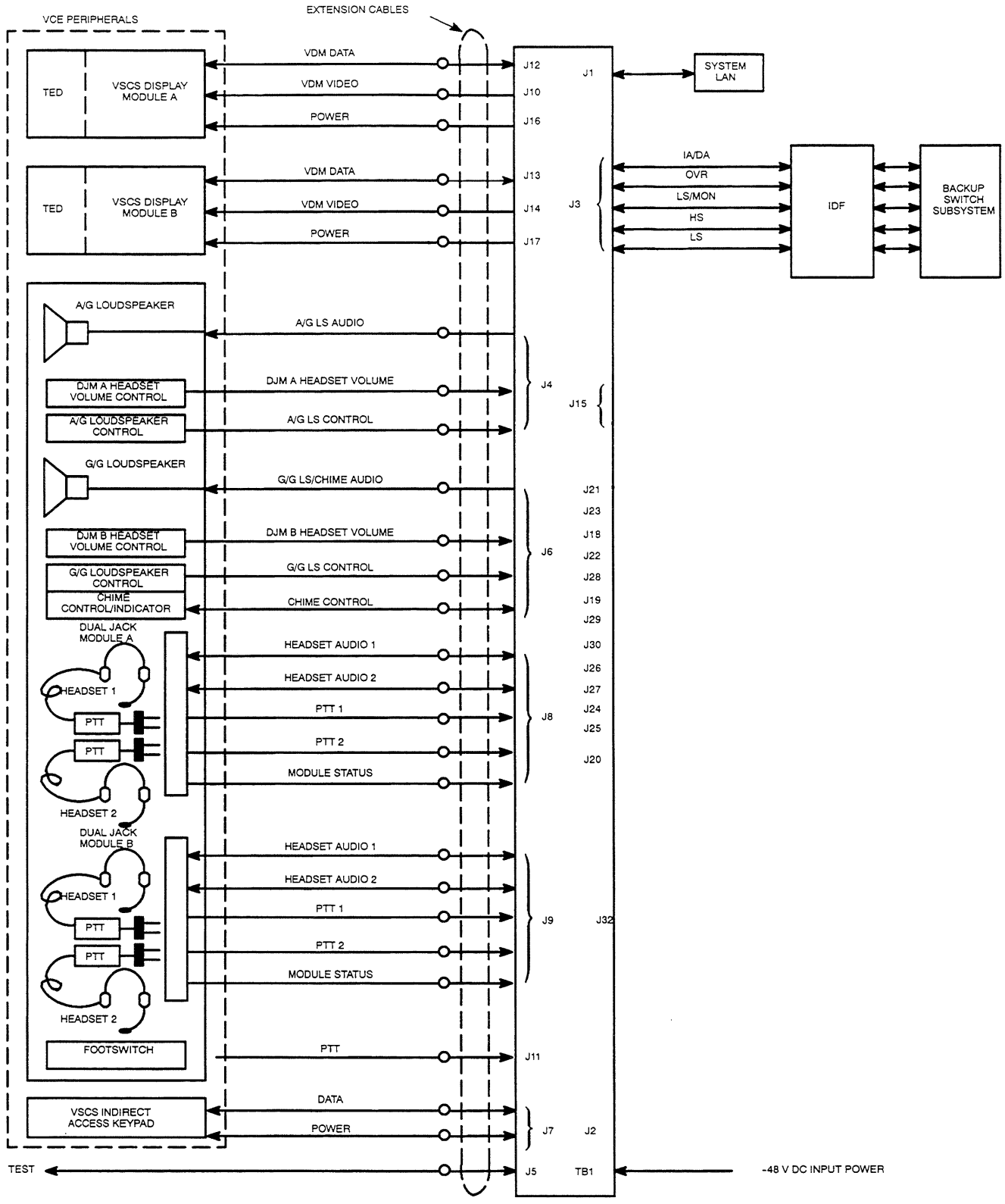


FIGURE 2–4. VTABS TRAINING SUBSYSTEM PEM INTERFACES

24. VSCS CONSOLE EQUIPMENT PERIPHERALS.

a. The VCE peripheral equipment consists of handset or headset with a push-to-talk (PTT) switch or an associated PTT footswitch, VDM A and VDM B equipped with a Touch Entry Device (TED), the VIK, and A/G and G/G LSs. The position's audio (voice) communications interface is the handset or headset. Handsets and headsets are connected to PEMs via the DJMs. The transmission path is established by using the VDM TED, or the VIK.

b. The user can use the handset or headset to privately monitor incoming conversations. The A/G and G/G LSs have a chime to serve as incoming call alert. The VCE peripherals connect to the PEM via the PEMs A/B CCA. Calls are initiated by the user via the VDM TED or the VIK keypad. Calls are initiated by touching one of the on-screen DA buttons or by keying in a specified number sequence from the VIK. Indications on the VDM screen such as color changes and/or flashing button areas identify the progress of the call.

c. Two VDMs are in each PEM position. The VDM is an interactive color monitor with a TED mounted to the video display area. A TED is the operator's interface for initiating communications paths between consoles and A/G or G/G communications equipment and for invoking other control actions.

d. The VIK interfaces to the PEM at each of the VSCS positions. The VIK is attached by a cable and connector to a panel mounted connector on the VCE. The interface provides power, and duplex, RS–422A serial 9600 Bits Per Second (BPS) synchronous communications link. The VIK translates the American National Standards Institute (ANSI) code for the American Standard Code for Information Interchange (ASCII) data into a form that can be displayed on the alphanumeric display or used to control VIK functions. The VIK encodes and formats key press data for transmission to the VEM/PEM.

e. The G/G LS module consists of an LS, LS volume control, chime ON/OFF switch equipped with volume control, chime status indicator, and two headset volume controls for DJM B headsets. The A/G LS module is similar to the G/G LS except that there is no chime volume control, Light Emitting Diode (LED), or ON/OFF control.

f. Two DJMs are provided at the VSCS Console. The DJM provides interface connections for the headsets and/ or the handsets. The DJM interfaces with the PEM for audio signal processing and status reporting. The DJM provides the required plug compatibility with the existing ARTCC headsets and/or handsets.

g. The PTT Footswitch provides the operator with the same capability as the PTT switch on the headset or handset.

h. The VCE headset microphone converts sound to electrical signals, which are provided as input to the VEM/PEM.

i. The handsets are equipped with PTT switches and provide the required transmission and reception of audio signals when plugged into the DJM and a valid transmission path has been established.

Section 1. EQUIPMENT DESCRIPTION

25. SYSTEM MONITOR AND CONTROL.

a. VTABS provides two independent SMC subsystems: one for the Backup Subsystem, and one for the Training Subsystem. Both SMCs are configured identically. The functionality that is provided by the SMC is similar to that of the VSCS CS (Tandem Computer), which provides the monitor and control functionality for the VSCS. This includes the performance of supervisory, data entry, maintenance, and monitoring functions.

b. The SMC interfaces with the system LAN and the workstation LAN via Type T BNC connectors that are connected to the buses. The SMC provides the following functional support:

System Initialization
Status Monitoring
Reconfiguration
System Administration

c. The CHI needed to perform these functions is provided from either the SMC or a VTABS workstation. The SMC supports supervisory functions, data entry functions, and maintenance functions needed to allow each subsystem to be defined with an address, initialized, and configured with requisite position maps. Health status of VTABS is reported in real time, with health and service status being treated independently.

26. VTABS WORKSTATIONS.

a. The VTABS Backup Switch is equipped with four position workstations. The workstations utilize a display of VTABS equipment status which closely follows the hierarchical structure of VTABS equipment. VTABS uses a common hardware platform and executable software to provide control and status CHI for Supervisor, DEO, AOP Manager (NOM), and Maintainer workstations. Reconfiguration, diagnostics, report generation, map building, system hardware configuration, logon and logoff, adjustment of volume levels, and setting system time and date records can be accomplished at a workstation with the required classmarks. The functionality provided at the workstation is determined at the time of the user logon, based on the user's classmarks. VTABS operations that are currently in progress are displayed for each piece of equipment. The status of Logical Units (LU), Logical Entities (LE), and LRUs are indicated with a green color field indicating a healthy condition. A yellow color field indicates a degraded condition, and a red colored field indicates a failed condition. A red X placed over an equipment Icon indicates loss of communications to that equipment.

b. The Power Subsystem Status consists of Inverter Failure, Rectifier Failure, AC Power Failure, and Low Power alarms.

c. The most recent event is displayed on the Status Summary Screen. The Physical Position Equipment Status displays a Graphical/Textual indication of status of the position's physical equipment including VDM 1, VDM 2, G/G Speaker, A/G Speaker, Footswitch, VIK, DJM A, DJM B, Temperature, Digital Line Units (DLU), A/G Headset/Handset (HS), A/G LS, G/G LS/MON, G/G OVR, G/G IA/DA.

d. Events are categorized in three classes as follows:

(1) Class 1 — Critical event which requires immediate operator intervention.

(2) Class 2 — Warning event with significance, but not critical. Requires operator notification.

(3) Class 3 — Informational event that does not require intervention or notification by operator.

e. The Event List is stored in a Structured Query Language (SQL) server data base, accessible via a pull-down menu screen. It includes Start Date, Start Time, End Date, End Time, Include Classes, Sort By, format.

f. VTABS Backup Subsystem and Training Subsystem workstations are connected to their respective SMC via Workstation LANs for supervisory, maintenance, and data entry/analysis of system data. A high speed printer (HSP) is connected to the Workstation LAN Hub and an optional Dot Matrix Printer can be connected to any workstation. The workstations for the VTABS are designated as the facility local Maintenance Position Equipment Subsystem (MPES) Workstation, the NOM Position Workstation, the Area Manager in Charge (AMIC) Workstation, the DEO Workstation, and the Master Instructor Workstation. Each position workstation is equipped with a local printer interface.

g. The Maintainer workstation is for use by the System Maintenance Operator (SMO). The maintainer and the NOM have the capability to request,

control, display, and store on-site test results. All fault conditions are reported to all workstations. The exact allocation of workstations will be site dependent as a results of site surveys. Maintainer and NOM workstations provide an event logging capability to control the operational mode (in service or OOS) of all VTABS system equipment. The VTABS Maintenance Log is maintained with the same level of detail as the VSCS Maintenance Log. The VTABS is designed to meet the same maintainability requirements of VSCS. VTABS Mean-Time-To-Repair (MTTR) is less than or equal to 30 minutes.

27. VTABS PATCH PANEL.

a. The VTABS patch panel provides for monitoring and patching A/G voice circuits, and G/G trunks for maintenance access. The patch panel provides access to all VTABS A/G and G/G interfaces allowing connection of external test equipment for audio measurements, and verification of voice channel integrity and related parameters. The patch panel can be used to isolate circuits from their external interfaces, and allows access to G/G trunk supervisory signaling. The VTABS patch panel allows the following:

(1) Insertion of test equipment signals to monitor and test audio tones, outgoing or incoming calls over trunks and interfaces.

(2) Access to equipment side of A/G and G/G circuits to support test and maintenance of VTABS switching equipment.

(3) Access to the line side of voice circuits.

b. The VTABS IDF (22A3) provides the data and circuit signaling connection points between VTABS and VCE. Tellabs trunk adapter modules are installed in the IDFs for interfacing and adapting to the various trunk types.

28. VTABS CAPACITY.

a. The capacity of VTABS is specified for both the Backup Subsystem and the Training Subsystem. The number of VTABS positions within each ARTCC is determined by the number of operational sectors at the ARTCC plus three additional positions, not to exceed a total of fifty positions. Three additional positions are used for non-controller positions such as the AMIC, NOM, and MPES.

b. VTABS System capacities are summarized as follows:

Resource	Backup Subsystem	Training Subsystem	Expanded Training
Positions	50	31	49
Trunks	126	68	156
Frequencies	190	126	254
Telephones	16	16	16
Recorders	0	24	24
Work-stations	24	24	24
SMC	1	1	1

29. EXTERNAL INTERFACES.

a. The ATC communicates through the VCE. Each VCE can be configured to provide A/G and G/G communications interface with the VTABS operator. Signal paths in the VTABS are from the VCE to the Position IDF. From the IDF to the recipient of the call, the path depends on whether the call involves communicating with an aircraft via an A/G radio, or between facilities or positions within a facility using G/G communications. The VTABS system and the VSCS system utilize the same VCE to coordinate controller actions with either the VTABS system or the VSCS system. Additionally, the VTABS system and the VSCS system interface to the same physical communications resources such as A/G frequencies and G/G trunks. Not withstanding this commonality of user-interface devices, VTABS and VSCS are not directly interfaced to one another. Since the VTABS and the VSCS are independent voice switching systems, actions taken by the controller while one of the voice switching systems is in use, are not communicated to the other voice switching system.

b. Voice Recorder Interface. In the VTABS Backup Subsystem, the interface to voice recording equipment is identical to the voice recording equipment interface to VSCS. It follows that there is no loss of voice recording capability or quality resulting from use of the VTABS Backup Subsystem. The VTABS Training Subsystem does not support voice recordings at the DYSIM positions. VTABS does provide audio cassette recorders for the purpose of recording individual training sessions at the DYSIM Master Instructor position.

30. VTABS DATA BASE.

Each VTABS subsystem data base consists of an equipment table, physical and logical site adaptation data (SAD), and configuration map data. Since the VTABS equipment table for each subsystem is defined for the maximum capacities of all VTABS resources within that subsystem, it should not require modification. The initial data base for each subsystem will contain all SAD and configuration map data needed to define the site's initial position maps. Changes to the VTABS data base are accomplished by a DEO at a VTABS workstation. With the appropriate user classmarks, a master instructor (Training Subsystem) or a supervisor (Backup Subsystem) also has the capability to perform DEO functions. The VTABS data base backup is performed on the SMC via Microsoft SQL. It is backed up to a Digital Audio Tape (DAT) which can be used to restore all or part of the system in the event of a failure.

31. BUILT IN TEST DIAGNOSTICS.

a. Built-In-Test (BIT) diagnostics are fault and failure isolation to the LRU level. Diagnostic Tests are executed through Workstation CHI. Real time VTABS equipment status is updated via a periodic status poll. Failures detected via BIT within the VTABS switch and PEM are reported to the SMC within the status poll response. Status information is processed by the SMC and then sent out to all VTABS workstations for graphical display. Manual Testing or OOS testing takes place after the LE/ LRU has been placed in the OOS state. Continuous testing is one form of OOS testing. It is automatic in the sense that several discreet tests can be selected and scheduled to run in sequence for a given LE/LRU. The sequence of tests will then run continuously for a total of 100 times for all tests selected. The first selected test will run to completion, and then request the next test in the sequence etc., continuing through the whole sequence of tests in this manner until a total of 100 tests have been run. Some VTABS equipment is not supported by BIT/Automated Fault Isolation (AFI) and requires manual fault isolation and troubleshooting techniques. This equipment requires user reported failure and manual fault isolation. Data collection and analysis is required to correctly identify and correct the equipment failure.

b. BIT/AFI is provided within the switch and PEM for In Service test applications. BIT/AFI is a mechanism for reporting Switch/PEM equipment failures.

c. Offline diagnostics provides VTABS system status reporting through OOS system commands of equipment tests for the switch and/or PEM. It is accomplished by taking the selected equipment out of service, and selecting the appropriate diagnostic routine(s).

32.–69. RESERVED.

CHAPTER 3. STANDARDS AND TOLERANCES

70. GENERAL.

This chapter prescribes the standards and tolerances for the VTABS equipment, as defined and described in Order 6000.15.

All key performance parameters and/or key inspection elements are clearly identified by an arrow (→) placed to the left of the applicable item.

NOTE: All reference paragraphs apply to this document unless otherwise indicated.

STANDARDS AND TOLERANCES

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
71. POWER SUBSYSTEM.				
a. Rectifier Section.				
(1) Input Voltage	PECO Manual[1]			
(a) Phase A–B.....		230 V ac Nominal	176 to 254 V ac	Same as Initial
(b) Phase B–C.....		230 V ac Nominal	176 to 254 V ac	Same as Initial
(c) Phase C–A.....		230 V ac Nominal	176 to 254 V ac	Same as Initial
(2) Output Float Voltage ...	105	54.00 V dc	48 to 54 V dc 57 V dc (max)	Same as Initial
b. Inverter Section.				
(1) Input Voltage	PECO Manual[1]	−48 V dc	Same as Standard	Same as Standard
(2) Output Voltage.....		117 V ac Nominal	114 to 120 V ac	Same as Initial
c. Battery Voltage	110	−12 V dc each battery −48 V dc each tray	Same as Standard	Same as Standard
d. Alarm Voltage.				
(1) High Voltage (HV) ..... Adjustment.	117	57 V dc	±0.3 V dc	Same as Initial
(2) Low Voltage (LV) ..... Adjustment.	117	45 V dc	±0.3 V dc	Same as Initial
(3) Battery Disconnect ..... Voltage.	118	44 V dc	±0.3 V dc	Same as Initial
(4) Battery Pickup ..... Voltage.	118	49 V dc	±0.3 V dc	Same as Initial
e. Backup Battery Operational Reliability Duration.	119	20 Minutes Minimum	Same as Standard	Same as Standard
72. CONTROL SUBSYSTEM.				
SMC Workstation Hard Disk Drive.....	115	Error free operation	Same as Standard	Same as Standard

1 PECO II, Inc. Instruction Manual

STANDARDS AND TOLERANCES (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
73. SWITCHING SUBSYSTEM.				
a. Switch Shelf Power Supply Voltages.	107	+5 V dc	±.05 V dc	Same as Initial
		−5 V dc	±.05 V dc	Same as Initial
		−5.2 V dc	±.052 V dc	Same as Initial
		+12 V dc	±.12 V dc	Same as Initial
		−12 V dc	±.12 V dc	Same as Initial
		−48 V dc	±.48 V dc	Same as Initial
→ **b. Operation of Backup Switch.**	106	Successful no-fault execution	Same as Standard	Same as Standard
→ **c. Control Shelf Diagnostics.**	108	Successful no-fault execution	Same as Standard	Same as Standard
d. A/G Voice Circuits	201			
(1) Transmit/Receive Audio Levels.		−8 decibels (in reference to one milliwatt) (dBm)	±1.5 decibels (dB)	Same as Initial
(2) Level Regulation (Receive).		−9 dBm	±1.5 dB	Same as Initial
(3) Background Noise		23 decibels (above the relative noise c-weighted channel) (dBrnc) Maximum	Same as Standard	Same as Standard
e. G/G Voice Circuits Transmission Parameters, Single Circuit E&M Interface Card.				
(1) Type 3, 20 Hz Ring Out Trunk, Loop Start Office (LSO).	(4−Wire) 202			
Type 8, Local Dial Line (w/Tellabs 6131A).	(2−Wire) 203			

STANDARDS AND TOLERANCES (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(d) Transmit/Receive ... Levels.		−9 dBm	±1.5 dB	Same as Initial
(e) Level Regulation ... (Receive).		−9 dBm	±1.5 dB	Same as Initial
(f) Background Noise ..		23 dBrnc Maximum	Same as Standard	Same as Standard
(2) Type 3, 20 Hz Ring ... In Trunk Loop Start Station (LSS).	(4−Wire) 202			
Type 6 CO/PBX ..... Ext/Trunk (w/Tellabs 6131B).	(2−Wire) 203			
(a) Transmit/Receive ... Levels.		−9 dBm	±1.5 dB	Same as Initial
(b) Level Regulation ... (Receive).		−9 dBm	±1.5 dB	Same as Initial
(c) Background Noise ..		23 dBrnc Maximum	Same as Standard	Same as Standard
(3) Type 3, E&M ..... Ringing/Loop Trunk, LSO, RD, LSS, Ring-down No Supervision (RDNS) PABX, E&M Same Facility (w/Tellabs 6131D).	202			
(a) Transmit/Receive ... levels.		−9 dBm	±1.5 dB	Same as Initial
(b) Level Regulation ... (Receive).		−9 dBm	±1.5 dB	Same as Initial
(c) Background Noise ..		23 dBrnc Maximum	Same as Standard	Same as Standard
(4) Type 3, SF E&M ..... Ringing/ Loop Tone-on-Active Trunk RD, RDNS (w/Tellabs 6047JAM1).	202			
(a) Transmit/Receive ... levels.		−9 dBm	±1.5 dB	Same as Initial

STANDARDS AND TOLERANCES (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(b) Level Regulation ... (Receive).		−9 dBm	±1.5 dB	Same as Initial
(c) Background Noise ..		23 dBrnc Maximum	Same as Standard	Same as Standard
(5) Type 3, SF E&M ..... Ringing/ Loop Tone-on-Idle Trunk TB, RD, LSS, RDNS (w/Tellabs 6048A).	202			
(a) Transmit/Receive ... levels.		−9 dBm	±1.5 dB	Same as Initial
(b) Level Regulation ... (Receive).		−9 dBm	±1.5 dB	Same as Initial
(c) Background Noise ..		23 dBrnc Maximum	Same as Standard	Same as Standard
(6) Type 7, DX Trunk .... PABX, DX Trunk (w/Tellabs 6131C).	202			
(a) Transmit/Receive ... levels.		−9 dBm	±1.5 dB	Same as Standard
(b) Level Regulation ...		−9 dBm	±1.5 dB	Same as Initial
(c) Background Noise ..		23 dBrnc Maximum	Same as Standard	Same as Standard
f. G/G Voice Circuits Transmission Parameters SF Vox Interface Card.				
(1) Type 3, 2600 Hz ..... Tone Burst.	202			
(a) Transmit/Receive ... levels.		−9 dBm	±1.5 dB	Same as Initial
(b) Level Regulation ... (Receive).		−9 dBm	±1.5 dB	Same as Initial
(c) Background Noise ..		23 dBrnc Maximum	Same as Standard	Same as Standard
(2) Type 4, 4/5, 5 ..... SS1/SS4 Signaling.	202			

STANDARDS AND TOLERANCES (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(a) Transmit/Receive . . . levels.		−9 dBm	±1.5 dB	Same as Initial
(b) Level Regulation . . . (Receive).		−9 dBm	±1.5 dB	Same as Initial
(c) Background Noise . .		23 dBrnc Maximum	Same as Standard	Same as Standard
(3) Type 7, SF Signaling . .	202			
(a) Transmit/Receive . . . levels.		−9 dBm	±1.5 dB	Same as Initial
(b) Level Regulation . . . (Receive).		−9 dBm	±1.5 dB	Same as Initial
(c) Background Noise . .		23 dBrnc Maximum	Same as Standard	Same as Standard
(4) Type 9, Voice Call	202			
(a) Transmit/Receive . . . levels.		−9 dBm	±1.5 dB	Same as Initial
(b) Level Regulation . . . (Receive).		−9 dBm	±1.5 dB	Same as Initial
(c) Background Noise . .		23 dBrnc Maximum	Same as Standard	Same as Standard
74. CUTOVER SWITCH.				
RESERVED.				
75. POSITION EQUIPMENT.				
a. PEM Power Supply dc Voltages.	109			
(1) +5 Volts (V)		+5 V dc	±.1 V dc	Same as Initial
(2) +15 V		+15 V dc	±.3 V dc	Same as Initial
(3) −15 V		−15 V dc	±.3 V dc	Same as Initial
(4) +24 V		+24 V dc VDM A	±.48 V dc	Same as Initial

STANDARDS AND TOLERANCES (Continued)

Parameter	*Reference Paragraph*	*Standard*	*Tolerance/Limit*	
			Initial	*Operating*
(5) +24 V		+24 V dc VDM B	±.48 V dc	Same as Initial
(6) +13.8 V		+13.8 V dc	±.69 V dc	Same as Initial
(7) −48 V		−48 V dc	−47 to −59 V dc	Same as Initial
b. Legal Recording Equipment Interface.				
Transmission level regulation ..... to legal recorders.	116	−10 dBm	±1.5 dB	Same as Initial
76.–79. RESERVED.				

CHAPTER 4. PERIODIC MAINTENANCE

80. GENERAL.

This chapter establishes all the maintenance activities that are required for the VTABS on a periodic, recurring basis, and the schedules for their accomplishment. This chapter is divided into two sections. The first section identifies the performance checks (i.e., tests, measurements, and observations) of normal operating controls and functions, which are necessary to determine whether operation is within established tolerance/limits. The second section identifies other tasks that are necessary to prevent deterioration and/or ensure reliable operation. Refer to Order 6000.15, for additional guidance.

Section 1. PERFORMANCE CHECKS

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
81. DAILY.		
a. Control Subsystem.		
Visual check of summary status at a VTABS workstation.	Error free operation	103
b. Power Subsystem.		
(1) Check dc voltage on Meter and Alarm panel.	Visual inspection of meter	104
(2) Check for alarms on the Meter and Alarm panel and Inverter panel.	Visual inspection of LEDs	104
(3) Check manual battery disconnect switch	Visual inspection of switch and LED	104
(4) Check for tripped circuit breaker indications on Circuit Breaker panels.	Visual inspection of LEDs	104
(5) Check Rectifier and Inverter load sharing	Visual inspection of rectifier and inverter meters	104
82. WEEKLY.		
Power Subsystem.		
Record battery voltage and amps at Meter and Alarm panel.	71a(2)	105
83. MONTHLY.		
a. Switching Subsystem.		
Verify proper operation of the Backup Switching Subsystem.	Error free operation	106
b. Cutover Switch Subsystem.		
Verify proper operation of the Cutover Switch	Visual inspection of LEDs	106
84. QUARTERLY.		
a. Switching Subsystem.		
(1) Check switching subsystem shelf power supply LEDs and voltages.	73a	107

Section 1. PERFORMANCE CHECKS (Continued)

Performance Checks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
(2) Run Control Shelf Diagnostics	73c	108
b. Position Equipment.		
Check PEM LEDs and Power Supply Voltages	75a	109
c. Power Subsystem.		
(1) Measure and record individual battery float voltages.	71c	110
(2) Inspect backup batteries	Visual inpsection	111
(3) Check Rectifier Major (MJ) and Minor (MN) alarms.	Error free operation	112
(4) Verify Inverter Control Modules	Error free operation	113
d. System Interconnect Subsystem.		
(1) Check Workstation LAN Hub LEDs	Visual inspection	114
(2) Check System LAN Hub LEDs	Visual inspection	114
85. SEMIANNUALLY.		
Control Subsystem.		
Check SMC hard disk drive	Error free operation	115
86. ANNUALLY.		
a. Switching Subsytem.		
Measure Transmission Level Regulation To Legal Recorders.	75b	116
b. Power Subsystem.		
(1) Perform PECO High Voltage (HV) Adjustment.	71d(1)	117
(2) Perform PECO Low Voltage (LV) Adjustment.	71d(2)	117
(3) Perform PECO Battery Disconnect Voltage Adjustment.	71d(3)	118
(4) Perform PECO Battery Pickup Voltage Adjustment.	71d(4)	118
(5) Check Backup Battery Operational Reliability.	71e	119
87.–89. RESERVED.		

Section 2. OTHER MAINTENANCE TASKS

Maintenance Tasks	*Reference Paragraph*	
	Standards & Tolerances	*Maintenance Procedures*
90. DAILY.		
RESERVED.		
91. WEEKLY.		
RESERVED.		
92. MONTHLY.		
a. Control Subsystem.		
(1) Clean and check Laser Printer	Visual inspection	170
(2) Check SMC cooling fans	Visual inspection	171
(3) Clean SMC Cartridge Tape Drive	Cleaning and visual inspection	172
b. Switching Subsystem.		
Check switch cabinet fans and air filters	Visual inspection	173
c. Position Equipment.		
Check PEM cooling fan	Visual inspection	174
d. Power Subsystem.		
Check Rectifier cooling fan	Visual inspection	175
93. QUARTERLY.		
RESERVED.		
94. SEMIANNUALLY.		
Control Subsystem.		
Backup all CS files	Error free operation	176
95. ANNUALLY.		
Power Subsytem.		
a. Check battery connections and re-torque terminal bolts.	Visual inspection	177
b. Clean rectifier modules	Cleaning and visual inspection	178
c. Clean inverter modules	Cleaning and visual inspection	179
96.–99. RESERVED.		

CHAPTER 5. MAINTENANCE PROCEDURES

100. GENERAL.

This chapter establishes the procedures for accomplishing the various essential maintenance activities which are required for the VTABS, on either a periodic or incidental basis. The chapter is divided into three sections. The first describes the procedures to be used in making the performance checks listed in chapter 4, section 1. The second section describes the procedures for doing the tasks listed in chapter 4, section 2. The third section describes the procedures for doing special tasks, usually non-scheduled and not listed in chapter 4. Refer to Order 6000.15, for additional guidance. The procedures contained herein are those that cannot be found in the equipment instruction books.

101. TEST EQUIPMENT.

Test equipment generally available to field facilities is listed in table 5–1. The generic name is followed by a preferred item and a substitute item. The latter is expected to perform satisfactorily if the preferred item is unavailable.

102. SYSTEM PERFORMANCE ENTRIES.

Maintenance actions described herein should be logged into the MMS. Refer to TI 6030.1 for guidance and instruction.

TABLE 5–1. TEST EQUIPMENT LISTING

Generic Name	*Preferred Item*	*Substitute Item*
a. Transmission Impairment ..... Measurement Set (TIMS)	Ameritec Model AM5XT (or equivalent)	Hewlett Packard Model 4945A
b. DJM Break Out Box (BOB)/ .. Loopback Fixture	Harris Corp. Part No: 206451–G01	
c. Digital Volt-Ohm Meter ..... (VOM)	Fluke Model 45 (or equivalent)	Fluke Model 77
d. Wrist Strap Tester	3M 745	

Section 1. PERFORMANCE CHECK PROCEDURES

103. CHECK SYSTEM STATUS AT A VTABS WORKSTATION.

a. Object. To verify normal operation of the system.

b. Discussion. The review of the summary status is required on a daily basis to ensure normal system operation. The Summary status screen and System Status Reports will be reviewed for Failed, Degraded, and OOS equipment. If the status identifies any events that need more detail, review the Events List Details. Site personnel should select a standard time within each 24-hour period to review the summary status and reports. Refer to TI 6690.24, section 7, or TI 6690.25, section 6, for detailed instructions concerning system events.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Verify the VTABS workstation indicates CONNECTED at the bottom right of the screen. This indicates the workstation is communicating with the SMC. If the workstation LAN is failed, the screen may look normal, although failures may exist.

(2) Logon to the workstation.

(3) Review the Summary Status, Voice Switch, and Workstation windows for any Failed, Degraded, or OOS indications.

(4) Select Utilities from the main menu, then Reports and System Status from the drop down menu.

(5) In the VTABS Reports window select desired report, Current Dynamic PEM Report, Current Dynamic A/G Radio Report or Current Dynamic G/G Trunk Report, then OK button. Review the Service column of the report for any OOS. If any equipment is OOS take appropriate action to restore it to In Service.

(6) Close the VTABS Reports window by clicking on the menu bar at the top left corner of the window, then select Close.

(7) Repeat steps 4 through 6 of this paragraph until all reports, PEM Report, A/G Radio Report, and G/G Trunk Report, have been reviewed.

104. CHECK POWER SUBSYSTEM STATUS.

a. Object. To verify that the PECO II power subsystem is fully operational and that there are no alarm conditions.

b. Discussion. The status of the power subsystem will be checked, at the PECO equipment, for float voltage, alarm indications, load sharing, tripped circuit breakers, and battery disconnect.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) At the Meter and Alarm Panel in cabinet 27A2A5, verify that the dc output float voltage is within tolerance. Refer to Chapter 3, Standards and Tolerances, paragraph 71a(2).

(2) At the Meter and Alarm Panel in cabinet 27A2A5, verify that there are no alarm conditions. Verify the state of the following LEDs:

(a) PWR ON	Green
(b) AC FAIL	Extinguished
(c) RFA MIN	Extinguished
(d) RFA MAJ	Extinguished
(e) DFA	Extinguished
(f) LV	Extinguished
(g) HV	Extinguished
(h) BATT DISC	Extinguished
(i) ALARM TEST	Extinguished

(3) At the Meter and Alarm Panel in cabinet 27A2A5, verify that the Manual Battery Disconnect switch is in the up position. The Battery Manually Disconnected LED should be extinguished.

(4) At circuit breaker panels 27A2A1, A2, A3, and A4, verify that the circuit breaker FA LED is extinguished. There is one LED on each panel.

(5) At the Inverter Power and Control shelf 27A3A1, verify the state of the following LEDs on the Alarm Module:

(a) DC POWER ON	Green
(b) INV ON	Green
(c) LOAD	Green
(d) INV FAIL	Extinguished
(e) BRKR OPEN	Extinguished
(f) HIGH TEMP	Extinguished

(6) At the Inverter Power and Control shelf 27A3A1, verify that one of the two Inverter Control Modules ON LED is illuminated Green.

(7) In cabinets 27A3A2, A3, and A4 verify the state of the following LEDs on each Inverter Module:

(a) ON	Green

(Lowest LED on the bar graph. As the load is increased, more of the LOAD LEDs will illuminate)

(b) OVERLOAD	Extinguished

(Top LED on the bar graph)

(8) In cabinets 27A2A9, A10, A11, and 27A3A6, A7, and A8, verify the following conditions on each rectifier module:

(a) AC Input Circuit Breaker	ON
(b) DC Output Circuit Breaker	ON
(c) Standby/On Switch	ON
(d) Float/Equal Switch	Float
(e) GO LED	Green
(f) Select Switch	A

All of the rectifiers should read approximately the same dc current on the digital meter on each rectifier. This reading will be site specific depending on the number of PEMs in the VTABS.

NOTE: DC current on any one or two rectifiers will read higher than the rest. This is normal.

105. RECORD BATTERY VOLTAGE AND AMPS AT METER AND ALARM PANEL.

a. Object. To verify and record the PECO II power subsystem dc output.

b. Discussion. The power subsystem dc output voltage and amperage will be recorded at the Meter and Alarm panel in cabinet 27A2A5.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) In cabinet 27A2A5, operate the VOLT/AMPS switch to VOLT and record the dc voltage on the panel digital meter.

(2) In cabinet 27A2A5, operate the VOLT/AMPS switch to AMPS and record the dc amperage on the panel digital meter.

106. SYSTEM VERIFICATION.

a. Object. To verify that the VTABS equipment is fully operational and available to provide its advertised service to the users.

b. Discussion. Verification is accomplished by bulk transferring ATC positions and A/G and G/G resources from VSCS to VTABS. VTABS elements that provide A/G and G/G services will be verified to be capable of operating as the primary A/G and G/G communication switch.

c. Test Equipment Required. None.

d. Conditions. Maintenance personnel should be familiar with the current version of the operational program, equipment configuration, and operating instructions of the facility. This procedure should be performed at a time, selected by ATC, that will not adversely affect AT operations.

e. Detailed Procedure. Refer to TI 6690.25, Section 6, Maintenance Procedures, for additional information.

CAUTION: When a transfer is performed, G/G calls will be disconnected and will have to be reinitiated by the user, and A/G communications will have to be re-selected by the user.

NOTE: Coordinate with ATC before initiating a bulk transfer of the Cutover Switch.

(1) At the NOM or MPES position, insert key into the Remote Bulk Transfer switch. Turn key to ENABLE (and hold) and press bulk transfer button "B" to initiate a bulk transfer to VTABS. When released, the key will return to DISABLE.

(2) Open Cutover Switch cabinet doors and verify that the "B" and "C" LEDs, on all A/G and G/G interface cards, are illuminated indicating resources have been switched to VTABS. LEDs 1, 2, 3, and 4 on all "G" modules should be illuminated green, indicating the PEMs have been switched to VTABS. Close cabinet doors.

(3) Verify that the VTABS LED, on the front panel of the PEM, is illuminated Amber at all VTABS positions.

(4) The VTABS positions should have a message displayed on the VDMs indicating the transition to VTABS was successful. Insert an HS into the DJM of the VTABS positions, not being used by ATC, and verify the following message is displayed on the VDMs:

VTABS PEM is now Operational

(5) Initiate an IC call to another VTABS position, to verify functionality.

(6) Verify, with ATC, that the remaining used VTABS positions are operational on VTABS. VTABS will remain the primary system for controlling AT for a predetermined time period.

CAUTION: When a transfer is performed, G/G calls will be disconnected and will have to be reinitiated by the user. A/G communications will have to be re-selected by the user.

NOTE: Coordinate with ATC before initiating a bulk transfer of the Cutover Switch.

(7) At the end of the predetermined time period, turn the Remote Bulk Transfer switch key to ENABLE (and hold) and press bulk transfer button "A" to initiate a bulk transfer to VSCS.

(8) Open the Cutover Switch cabinet doors, and verify that the "A" and "N" LEDs, on all A/G and G/G interface cards, are illuminated indicating resources have been switched to VSCS. LEDs 1, 2, 3, and 4 on all "G" modules should be illuminated Red, indicating the PEMs have been switched to VSCS. Close cabinet doors.

(9) Verify that the VSCS LED, on the front panel of the PEM, is illuminated Green at all VTABS positions, and that all VTABS positions are now operational on VSCS.

107. CHECK SWITCHING SUBSYSTEM SHELF POWER SUPPLY LEDS AND VOLTAGES.

a. Object. To verify that the Switching Subsystem shelf power supplies are functioning properly.

b. Discussion. There are three shelf power supplies on the right side of the 19A1 switch cabinet and two shelf power supplies on the right side of each of the 19A2, 19A3, and 19A4 switch cabinets. Each power supply has seven dc test points and two LEDs.

(1) Location 19A1A7, PS1 is power for CE Shelf A1.

(2) Location 19A1A7, PS2 is power for CE Shelf A2.

(3) Location 19A1A8, PS1 is power for Peripheral Shelves A4, A5, A6.

(4) Location 19A2A7, 19A3A7, 19A4A7, PS1 is power for Peripheral Shelves A1, A2, A3.

(5) Location 19A2A8, 19A3A8, 19A4A8, PS1 is power for Peripheral Shelves A4, A5, A6.

c. Test Equipment Required. Digital VOM.

d. Conditions. This procedure can be performed at any time.

CAUTION: When making voltage measurements, exercise caution near the circuit breaker/switch not to inadvertently trip the breaker to OFF.

e. Detailed Procedure.

(1) Open switch cabinet front door of the unit under test.

(2) Check for lit green LEDs on DC OUT, and −48V IN.

(3) Using a digital VOM connect the black probe to GND test point and measure the dc voltages on the following test points:

(a) +5 V

(b) −5 V

(c) −5.2 V

(d) +12 V

(e) −12 V

(f) −48 V

(4) Close switch cabinet front door.

(5) Repeat this procedure for remaining switch cabinets.

108. RUN CONTROL SHELF DIAGNOSTICS.

a. Object. To verify that the CE shelves are operating error free.

b. Discussion. This procedure should be performed on the Backup Subsystem control shelf and the Training Subsystem control shelf.

NOTE: When performing this procedure VTABS will not be available for ATC or for DYSIM training. For more information on diagnostics tests, refer to TI 6690.25, Section 11, VTABS Diagnostic Flow Charts, and Table 11−6, Switching Subsystem Diagnostic Test Listing.

c. Test Equipment Required. None.

d. Conditions. This procedure must be coordinated with ATC and DYSIM training. The control shelf under test must be OOS.

e. Detailed Procedure. Logon to a VTABS workstation and perform the following:

(1) Select appropriate screen, for control shelf to be taken OOS.

(2) Right mouse click on the control shelf to be taken OOS.

(3) From the pop-up menu select Service.

(4) From the Service cascading submenu select Out Of Service.

(5) At the Service Change Verification window select Yes option button. The Service Change Verification window is removed and the Service Change Window is displayed with the following message:

Service Change Sent

(6) At the Service Change Window select the OK button. The Service Change window is removed and the equipment is transitioned to Out Of Service.

(7) Right mouse click on control shelf to be tested.

(8) From the pop-up menu select Diagnostics.

(9) From the Diagnostic Testing window, under Description, select all tests.

NOTE: Select first test, hold down the Shift key and select the last test, or click on the first test and drag the mouse pointer down to the last test, to select all tests.

(10) Select Start Tests button.

(11) Test results will be displayed in the Tests Results portion of the Diagnostic Testing window.

NOTE: Perform the following for a printed copy of the test results. (Otherwise, proceed to step 13 of this paragraph.)

(a) From the Diagnostic Testing window select Report button. The Diagnostic Testing Results Report window is displayed behind the Diagnostic Testing window.

(b) Select the Close button to remove the Diagnostic Testing window and display the Diagnostic Testing Results Report window.

(c) From the Main Menu select Utilities.

(d) From the Utilities pull down submenu select Print.

(e) From the print window select OK. The report is sent to the printer and the Print window is removed.

(f) Close the Diagnostics Testing Results Report window by clicking on the menu bar at the top left corner and select Close.

(12) When all tests have passed, select the Close button to remove the Diagnostic Testing window.

(13) Right mouse click on the control shelf to be restarted. A Restart must be performed to ensure the shelf has valid code.

(14) From the pop-up menu select Restart.

(15) From the Restart cascading submenu select Initiate.

(16) From the Initiate Restart Verification window select the Yes button.

(17) After the Restart is completed, right mouse click on the control shelf to be returned to In Service.

(18) From the pop-up menu select Service.

(19) From the Service cascading submenu select In Service.

(20) At the Service Change Verification window select Yes option button. The Service Change Verification window is removed and the Service Change Window is displayed with the following message:

Service Change Sent

(21) At the Service Change Window select the OK button. The Service Change window is removed and the control shelf is transitioned to In Service.

(22) Close all other windows opened by this procedure and return to the Summary Status screen.

(23) Initiate an IC call to another VTABS position, to verify functionality.

109. CHECK PEM LEDS AND POWER SUPPLY VOLTAGES.

a. Object. To verify that the PEM power supplies are functioning properly.

b. Discussion. PEMs are located at the rear of selected DSR consoles on a shelf above the position. On the PEM front panel, there are eight LEDs, and nine dc test points.

c. Test Equipment Required. Digital VOM.

d. Conditions. This procedure can be performed at anytime.

e. Detailed Procedure.

(1) Verify the following LEDs are illuminated **Green**:

(a) −48 V (input)

(b) +5 V

(c) +15 V

(d) −15 V

(e) +24 V

(f) REMOTE

(g) VSCS (when switched to VSCS)

(2) Verify the VTABS LED is illuminated **Amber** (when switched to VTABS).

(3) Using a digital VOM connect the black probe to GND test point and measure the dc voltages on the following test points:

(a) +5 V

(b) +15 V

(c) −15 V

(d) +24 V (VDM A)

(e) +24 V (VDM B)

(f) 13.8 V (VIK)

(4) Using a digital VOM connect the black probe to −48 V RTN and measure the dc voltage of the −48 V test point.

(5) Repeat for the remaining PEMs.

110. MEASURE AND RECORD INDIVIDUAL BATTERY FLOAT VOLTAGE.

a. Object. To measure and record the float voltage of each 12-volt battery in the power subsystem.

b. Discussion. This procedure will be performed at the PECO power subsystem. There are four batteries on each battery tray and each system can have up to five trays for a total of twenty batteries. The batteries weigh approximately 100 lbs. each, approximately 400 lbs. per tray. Exercise caution when sliding the battery tray out of the cabinet.

c. Test Equipment Required. Digital voltmeter and a 5/16-inch hex wrench.

d. Conditions. This procedure should be performed when VTABS is the standby system.

WARNING: ELECTRICAL SHOCK AND SHORT CIRCUIT HAZARD. Exercise extreme caution when working on the batteries in this system. **DO NOT allow anything metal to contact both terminals of a battery, or the NEGATIVE terminal to frame ground.**

e. Detailed Procedure.

(1) Using a 5/16-inch hex wrench, unlock the front and rear doors of battery cabinet 27A1.

(2) Slide one battery tray out of the cabinet.

(3) Using a digital voltmeter measure and record the float voltage of each battery.

(4) Slide the battery tray back into the cabinet.

(5) Repeat steps two through four of this paragraph to measure all batteries in the system.

(6) Close cabinet doors and latch with a 5/16-inch hex wrench.

111. INSPECT BACKUP BATTERIES.

a. Object. To verify the physical condition of each battery.

b. Discussion. There are four batteries on each battery tray and each system can have up to five battery trays for a total of twenty batteries. The batteries weigh approximately 100 lbs each, approximately 400 lbs per tray. Exercise caution if sliding battery tray out of cabinet.

c. Test Equipment Required. A 5/16-inch hex wrench and flashlight.

d. Conditions. This procedure can be performed at any time.

WARNING: ELECTRICAL SHOCK AND SHORT CIRCUIT HAZARD. Exercise extreme caution when working on the batteries in this system. **DO NOT allow anything metal to contact both terminals of a battery, or the NEGATIVE terminal to frame ground.**

e. Detailed Procedure.

(1) Using a 5/16-inch hex wrench, unlock front and rear doors of the battery cabinet 27A1.

(2) Slide one battery tray out of the cabinet.

(3) Check batteries for looseness of connectors, signs of deterioration, such as corrosion on terminals, and/or leakage of fluids.

(4) If any batteries need replacing, refer to the PECO instruction manual.

(5) Slide the battery tray back into the cabinet.

(6) Repeat steps two through five of this paragraph for remaining batteries in the system.

(7) Close cabinet doors and latch with a 5/16-inch hex wrench.

112. CHECK RECTIFIER MAJOR AND MINOR ALARMS.

a. Object. This procedure will verify that the Rectifier Fail Alarm (RFA) MN and the RFA MJ LEDs are functioning properly and that a Class 1, Rectifier Fail Alarm, is received at a VTABS workstation.

b. Discussion. This procedure will be performed at the PECO power subsystem. The RFA MN and MJ LEDs are located on the Meter and Alarm panel in the power subsystem cabinet 27A2A5. One failed rectifier is a MN alarm. Two or more failed rectifiers is a MJ alarm. A Class 1, Rectifier Fail Alarm, is received at the workstation when either an RFA MN or RFA MJ occurs. There is no distinction, at the workstation, between a MN or MJ alarm. Rectifiers are located in cabinets 27A2A9, A10, and A11, and in cabinet 27A3A6, A7, and A8. Each cabinet has a capacity of twelve rectifiers. LEDs are located at the top of each rectifier front panel.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Slide the STANDBY/ON switch, on any one of the rectifiers, to the "STANDBY" position.

(2) Verify the FAIL LED, on the failed rectifier front panel, is illuminated Red.

(3) Verify the RFA MN LED, located on the Meter and Alarm panel, is illuminated Amber.

(4) Verify that a Rectifier Fail Alarm is received at the VTABS workstation, and Power Subsystem and Rectifier status transition to Red and Failed.

(5) Slide the STANDBY/ON switch, on a second rectifier, to the STANDBY position.

(6) Verify the FAIL LED, on the second failed rectifier front panel, is illuminated Red.

(7) On the Meter and Alarm panel, verify the RFA MN LED is extinguished, and the RFA MJ LED is illuminated Red.

(8) Slide the STANDBY/ON switch, on both failed rectifiers, to the ON position.

(9) Verify that all rectifier alarms extinguish, and Power Subsystem and Rectifier status, at the workstation, returns to Green and Healthy.

113. VERIFY INVERTER CONTROL MODULES.

a. Object. To verify that both Inverter Control Modules are functioning properly.

b. Discussion. This procedure will be performed at the PECO power subsystem. There are two Inverter Control Modules located in cabinet 27A3A1. The active control module ON LED will be illuminated Green. The standby control module ON LED will be extinguished. This procedure will alternate the Inverter Control Modules.

c. Test Equipment Required. None.

d. Conditions. This procedure should be performed when VTABS is the standby system.

e. Detailed Procedure.

(1) At the Inverter Control Modules, press the RESET button on the module that does not have an ON LED illuminated. This will illuminate the ON LED Green and transfer inverter control to this module.

(2) Verify that the ON LED is extinguished on the control module that is now standby.

114. CHECK SYSTEM AND WORKSTATION LAN HUB LEDS.

a. Object. To verify that the LAN hubs are functioning properly.

b. Discussion. The LAN hubs are the CentreCOM 3012TR (12 port), and 3024TR (24 port), 10Base–T Multiport Repeater. They are located at the VTABS IDF, 22A4, and LAN hub rack, 23A1, in the DSR console area. There are two independent LANs. The switching subsystem and the PEMs communicate with the SMC via the System LAN. The workstations and HSP communicate with the SMC via the Workstation LAN.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure. Verify the following LEDs on the hubs are illuminated:

(1) Steady green POWER.

(2) Steady green PORT OK for the AUI connector.

(3) Steady green PORT OK for the BNC connector.

(4) Steady green PORT OK for each port with a cable plugged in.

115. CHECK SMC HARD DISK DRIVE

a. Object. To verify that there is no deterioration of the SMC hard disk drive.

b. Discussion. This procedure will verify files and directories, and check/repair errors on the hard disk drive. This procedure should be performed on both the Training SMC and the Backup SMC. For additional information click on the Start button on the Task Bar, then select Help. In the Help Topics window select the Contents tab, then double click on How To, Maintain Your Computer, Detecting and repairing disk errors.

c. Test Equipment Required. None.

d. Conditions. This procedure must be coordinated with ATC and DYSIM training.

e. Detailed Procedure.

(1) Logon to the SMC workstation. The logon must have administrator privileges.

(2) On the Windows desktop double click on **My Computer** icon.

(3) In **My Computer** window right click on the **(C:)** icon, then select **Properties**.

(4) In the Properties window click on the **Tools** tab.

(5) Under Error Checking click **Check Now**.

(6) In the Check Disk dialog window, select **Scan for and attempt recovery of bad sectors** check box, then click on the Start button.

The Disk Checking window will display activity as Phase 1 and Phase 2.

(7) When the Disk Check Complete message appears click on the **OK** button.

(8) Close all windows previously opened by this procedure.

116. MEASURE TRANSMISSION LEVEL REGULATION TO LEGAL RECORDERS.

a. Object. To verify correct transmission levels to the legal recorders. A 1004 Hz tone will be transmitted at −17 dBm, −9 dBm, and +3 dBm to also test the levels regulation of the position Automatic Gain Control (AGC).

b. Discussion. This testing must be coordinated with ATC. An A/G frequency that appears on the position under test, and the position under test, must be released by ATC. This procedure will need to be performed at each VTABS position.

c. Test Equipment Required. Two TIMS, test cords, DJM/BOB, legal recorder patch panel reference documentation, and TI 6690.25, Table 6−16, Backup Switch Subsystem Radio/Circuit Cross Reference.

d. Conditions. One ATC position, related recorder channels, and one A/G frequency will be unavailable during this procedure. The position, under test, must have an A/G map. The A/G DJM will be used to send test tone during this procedure. This will allow both recorder channels through the PEM to be checked.

CAUTION: At the Master Demarcation System (MDS), insert a test cord in the TX jack of the A/G test frequency, before starting any testing, to prevent test tones being transmitted.

e. Detailed Procedure.

(1) Open the CSS (8A1) cabinet doors. On the Master CPU (8A1A1, slot 1), enable the keyswitch by inserting the key and turning clockwise.

(2) On the associated A/G module, press transfer switch "B" to transfer the A/G frequency, under test, to VTABS. The "B" LED will illuminate Yellow.

(3) At the PEM of the position under test, set the A/B switch to the VTABS position. Verify the VTABS LED is illuminated Amber.

(4) If unsure which DJM is A/G, perform the following check at the position under test:

(a) Plug an HS into either DJM.

(b) At either VDM touch the SCRN ALT and UTIL buttons.

(c) To the right of the G/G and A/G buttons on the UTIL screen, the headset button will be white for the DJM in use.

(5) Plug the DJM/BOB into the A/G DJM and power ON the DJM/BOB.

(6) Power ON the TIMS at the position and configure it as follows to transmit the three different levels, as needed:

Line = 600 ohms (TX/RX),
TERM (BRDG off), 4W
Send = 1004 Hz
Level = [−9 dBm, −17 dBm, +3 dBm]

The Ameritec TIMS is set to these parameters by pressing the front panel buttons in the following sequence:

(a) Send Function Row Enable Key

(b) Function — 2 Enable Key

(c) Function — D Enable Key

(d) Function — # Enable Key (for negative level)

(e) Function — 9 Enable Key (−9 dBm)

(f) Function — 17 Enable Key (−17 dBm)

(g) Function — 6 Enable Key (+3 dBm, don't use #)

(h) Function — D Enable Key

(7) Connect a test cord from the TIMS TX jack to the TEST EQPT TX jack on the DJM/BOB.

(8) At the position under test, select the frequency to be used for testing. Press the PTT button on the DJM/BOB.

(9) Power ON the TIMS at the legal recorder patch panel and configure it as follows:

Line = 600 ohms (TX/RX), 4W, BRDG
Measure = LVL FREQ

be performed, the ac power to the Power Subsystem will be turned OFF, and VTABS will operate on Backup Batteries. ATC will need to be moved to non-VTABS positions and control AT from VSCS during this procedure. VSCS operations will not be interrupted.

e. Detailed Procedure.

NOTE: Coordinate the release of all VTABS PEMs, with ATC, before initiating a transfer of the PEMs to VTABS.

(1) Open Cutover Switch (8A1) cabinet doors. On the Master CPU (8A1A1, slot 1), enable the keyswitch by inserting the key and turning clockwise.

(2) Locate the Cutover Switch frame containing the "G" modules for the PEMs. On the CPU (SLOT 1), press the "B" transfer switch button to transfer all of the PEMs to VTABS. LEDs 1, 2, 3, and 4 on all "G" modules should be illuminated Green, indicating the PEMs have been switched to VTABS. Close cabinet doors.

(3) Verify that the VTABS LED, on the front panel of the PEM, is illuminated Amber at all VTABS positions.

(4) Insert an HS into the DJM of each VTABS position and verify the following message is displayed on the VDMs, indicating the transition to VTABS was successful:

VTABS PEM is now Operational

(5) Initiate an IC call to another VTABS position, to verify functionality.

(6) Locate and switch OFF the main circuit breakers that supply ac power to the Power Subsystem.

(7) Verify that Class 1 alarms, ac power failure, and rectifier failure, are reported at the Backup Subsystem workstations. The icons for AC Power and Rectifier will transition to Red and indicate Failed.

(8) Verify the following alarm indications at the Power Subsystem alarm panel:

AC FAIL LED — Red
RFA MJ LED — Red

Rectifiers LEDs:

FAIL LED — RED, on all Rectifiers
GO LED — OFF, on all Rectifiers

NOTE: When ac power is removed from VTABS, the Training Subsystem will automatically be disconnected from the Power Subsystem.

(9) Verify that the Training Subsystem positions, and switch cabinets 19A3, (and 19A4 if present), are without power. The Training Subsystem control shelf, in cabinet 19A1A2, remains powered up by the Backup Batteries. The Training Subsystem SMC, Workstations, and LANs remain powered up by Critical Power and are functional. The icons for all of the Training Subsystem PEMs will transition to Red, Failed, and a Red X.

(10) At the Training Subsystem SMC, perform a **VTABS Shutdown.** This will allow a more orderly startup of the PEMs after ac power is restored.

(11) VTABS will operate on backup batteries for approximately 25 minutes. Ensure that a Low Battery alarm does not occur during the first 20 minutes.

(12) Switch on the main circuit breakers that were switched OFF in step 6 of this paragraph.

(13) Verify that Class 2 alarms, ac power restored and rectifier restored, are reported to the Backup Subsystem workstations. The icons for AC Power and Rectifier will transition to Green and indicate Healthy.

(14) Verify that the following alarms are restored at the Power Subsystem:

AC FAIL LED — OFF
RFA MJ LED — OFF

Rectifiers LEDs:

FAIL LED — OFF, on all Rectifiers
GO LED — Green, on all Rectifiers

NOTE: Coordinate with ATC, before initiating a transfer of the PEMs to VSCS.

(15) Open Cutover Switch cabinet doors and locate the Cutover Switch frame containing the "G" modules for the PEMs. On the CPU (SLOT 1), press the "A" transfer switch button to transfer all of the PEMs to VSCS. LEDs 1, 2, 3, and 4 on all "G" modules should be illuminated Red, indicating the PEMs have been switched to VSCS.

(16) On the Master CPU (8A1A1, slot 1), disable the keyswitch by turning the key counterclockwise. Remove the key and close cabinet doors.

(17) Verify that the VSCS LED, on the front panel of the PEM, is illuminated Green at all VTABS positions, and that all VTABS positions are now operational on VSCS.

(18) At the Training Subsystem SMC workstation, perform a **VTABS SMC Startup**. Training Subsystem workstations will receive a **Forced Log-off** during the SMC startup. This is normal.

(19) Verify that all Training Subsystem positions are operating properly.

120.–169. RESERVED.

Section 2. OTHER MAINTENANCE TASK PROCEDURES

170. CLEAN AND CHECK LASER PRINTER.

a. Object. To ensure proper operation of the printer.

b. Discussion. None.

c. Test Equipment Required. Soft brush and small vacuum cleaner designed for cleaning toner.

d. Conditions. Printer is not available during this procedure.

e. Detailed Procedure.

(1) Turn the printer OFF.

(2) Open the top cover.

(3) Remove the toner cartridge by lifting up on the front of the cartridge and pulling it forward towards the front of the printer.

(4) With a soft brush and vacuum cleaner, remove any dust and toner residue that may have accumulated in the printer.

(5) Replace the toner cartridge in the printer. Use a new cartridge if necessary.

(6) Close the printer cover and turn the printer ON.

(7) After the warm up period, press the right side of the MENU button one time.

PRINTING MENU is displayed.

(8) Press the right side of ITEM button one time.

PRINT MENU MAP is displayed.

(9) Press the SELECT button.

PRINTING CONFIGURATION PAGE is displayed.

(10) The configuration page is printed.

(11) The printer returns to online automatically.

READY is displayed.

(12) Inspect the printout for quality of print.

171. CHECK SMC COOLING FAN.

a. Object. To ensure proper operation of system cooling fans.

b. Discussion. There are two fans on the rear of the CPU.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure. Place hand behind each fan on rear of CPU and check for outward air flow.

172. CLEAN SMC CARTRIDGE TAPE DRIVE.

a. Object. To ensure continuous proper operation.

b. Discussion. Whenever the Cartridge In Place status LED (green) flashes during operation, the drive heads should be cleaned with a cleaning cartridge. Also, as routine maintenance, the drive heads should be cleaned after the first four hours of tape movement of a new cartridge and thereafter every 25 hours of read/write operation. A cleaning cartridge provides approximately 30 uses.

NOTE: The slowly flashing green LED may also refer to a damaged tape or a tape nearing the end of its life. If cleaning the head does not correct the flashing LED condition, replace the cartridge. The slowly flashing LED does not indicate a loss of data nor does it affect the Small Computer System Interface (SCSI) operation. (A slowly flashing green LED in conjunction with the yellow LED indicates the presence of a prerecorded audio tape.

c. Test Equipment Required. Seagate qualified Digital Data Storage (DDS) DAT cleaning cartridge, Model 91301. This cartridge can be ordered from Seagate Technology in packaged multiples of five. The DDS cleaning cartridge contains the correct recognition holes to allow the drive to recognize that it is a cleaning cartridge.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Insert the cleaning cartridge into the tape drive. The drive immediately detects that the cartridge is a cleaning cartridge.

(2) The drive loads and runs the cartridge for about 30 seconds; then ejects the cartridge.

NOTE: Each time the cleaning cartridge is loaded, a new, unused portion of cleaning tape is advanced over the entire tape path. Eventually, the entire tape is used, and a new cleaning cartridge is required. Each cleaning cartridge provides approximately 30 uses. The drive will not rewind the cartridge. If an exhausted cleaning tape is used, the drive will eject the tape without completing a cleaning operation. This process takes just under 25 seconds.

(3) Remove the cleaning cartridge from the tape drive.

173. CHECK SWITCH CABINET COOLING FANS AND AIR FILTERS.

a. Object. To verify that the fans are functioning properly and air filters are clean.

b. Discussion. Each switch cabinet 19A1 through 19A4, has four fans located at top of the cabinet between the top shelf and the cabinet air grill. These fans run on dc and will run in only one direction. In the event of a fan failure, there are no alarms.

(1) There is one fan on each of the power supplies located on the right side of the switch cabinet.

(2) There are two air filters located on the inside of the switch cabinet front door and one filter in the bottom front of the cabinet.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) At the front of the cabinet, raise the air baffle and place hand over the two front fans to check for upward air flow. Listen for any unusual noises from the fans (i.e., bad bearings, etc.).

(2) At the rear of the cabinet, raise the air baffle and place hand over the two rear fans to check for upward air flow. Listen for any unusual noises from the fans (i.e., bad bearings, etc.).

(3) Open the switch cabinet front door and place hand or piece of paper in front of each power supply air intake grille and check for inward air flow.

(4) Remove the door air filters and bottom air filter. Check and replace as needed.

(5) Close cabinet door.

(6) Repeat this procedure for all cabinets in the system.

174. CHECK PEM COOLING FAN.

a. Object. To verify that the fans are functioning properly.

b. Discussion. The PEMs are mounted horizontally on a shelf at the rear of the DSR consoles. The fan is at the right end, (bottom of the PEM when vertical), and is a temperature controlled, variable speed fan. As the temperature increases in the PEM the speed of the fan increases proportionally.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Place a piece of paper over the air inlet grille to check for inward air flow. Listen for any unusual noises from the fan (i.e., bad bearings, etc.).

(2) Repeat for other PEMs in the system.

175. CHECK RECTIFIER COOLING FAN.

a. Object. To verify that the cooling fans are operating properly.

b. Discussion. The rectifiers are located in the Rectifier Cabinet, 27A2 and Rectifier/Inverter Cabinet, 27A3.

c. Test Equipment Required. None.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

At PECO cabinets 27A2 and 27A3 place hand, or piece of paper, in front of the fan on each rectifier to check for inward airflow. Listen for any unusual noises from the fans (i.e., bad bearings, etc.).

176. PERFORM SMC SYSTEM BACKUP.

a. Object. To backup all files to prevent loss of data in the event of a catastrophic system hard drive failure.

b. Discussion. A complete hard disk drive back up is required to restore the SMC functionality in the event of a catastrophic failure. This procedure should be performed on both the Backup SMC and Training SMC.

c. Test Equipment Required. One DAT cartridge.

d. Conditions. This procedure can be performed at any time.

e. Detailed Procedure.

(1) Log onto the SMC workstation. The logon must have administrator privileges.

(2) Insert a DAT cartridge tape into the tape drive.

(3) Click on the Start button on the Task Bar, then select Programs, Administrative Tools (Common), and Backup.

(4) In the Backup window maximize the Drives window Title Bar (lower left corner of window).

(5) Select checkbox to the left of C: drive to backup entire C: drive.

(6) Select Backup toolbar button.

(7) In the Backup Information window, select the Verify After Backup checkbox and the Backup Local Registry checkbox. Verify After Backup will increase the Backup time but should assure a valid backup tape.

(8) Under the Backup Set Information field, enter a description (i.e., SMC Gold [date of backup]) in the Description field and click OK.

NOTE: When using a previous backup tape a **Replace Information** pop-up window will appear with the question: **Do you want to replace this information?** Click on the Yes button.

The Backup Status window will be displayed and the Backup status is displayed in the Summary box.

NOTE: Any SQL files that are open and in use will be skipped and so indicated in the Summary box. The SQL files will be backed up using SQL Enterprise Manager on a site specific schedule. (Refer to TI 6690.25, Section 6, Data base Backup and Restore.)

(9) When the backup is complete the following message is displayed in the Summary box:

The operation was successfully completed.

(10) Select OK.

(11) Select the lower of the two minimize buttons (top right corner of the window) to minimize the Drives window.

(12) Select Operations from the main menu, then Exit.

(13) Remove, label, and store the tape cartridge.

177. CHECK BATTERY CONNECTIONS AND RETORQUE TERMINAL BOLTS.

a. Object. To verify the physical condition and connections of each battery.

b. Discussion. There are four batteries on each battery tray and a system can have up to five trays for a total of twenty batteries. The batteries weigh approximately 100 lbs. each, approximately 400 lbs. per tray. Exercise caution when sliding the battery tray out of the cabinet.

c. Test Equipment Required. A 5/16-inch hex wrench, a torque wrench with 7/16-inch socket, and a 7/16-inch open end or box wrench.

d. Conditions. This procedure should be coordinated with ATC and be performed when VTABS is the standby system. The batteries will be disconnected from the power subsystem and will not be available in the event of an ac power failure.

WARNING: ELECTRICAL SHOCK AND SHORT CIRCUIT HAZARD. Exercise extreme caution when working on the batteries in this system. **DO NOT allow anything metal to contact both terminals of a battery, or the NEGATIVE terminal to frame ground.**

e. Detailed Procedure.

(1) At cabinet 27A2A5, operate the Manual Battery Disconnect switch to the down position. The Battery Manually Disconnected LED will illuminate Red.

(2) Using a 5/16-inch hex wrench, unlock the front and rear doors of the battery cabinet.

(3) Slide one battery tray out of the cabinet.

(4) Inspect the battery terminals for darkened lugs, loose connections, broken wires, and signs of corrosion.

(5) Using a torque wrench with a 7/16-inch socket and a 7/16-inch open end or box wrench, re-torque the terminal bolts to 91.2 in. lbs. Refer to the PECO II manual, section 2.5 for torque values.

(6) Slide the battery tray back into cabinet.

(7) Repeat steps three through six of this paragraph for the remaining batteries in the system.

(8) Close the cabinet doors and latch with a 5/16-inch hex wrench.

(9) At cabinet 27A2A5, operate the Manual Battery Disconnect switch to the up position. The Battery Manually Disconnected LED will extinguish. This will restore the batteries to the power subsystem.

178. CLEAN RECTIFIER MODULES.

a. Object. To clean out the dust that accumulates in the rectifiers to ensure proper airflow for cooling.

b. Discussion. Each rectifier will be removed, **one at a time**, to blow out the accumulated dust.

c. Test Equipment Required. Compressed air and a flat blade screw driver.

d. Conditions. This procedure should be performed when the VTABS is the standby switch.

e. Detailed Procedure.

(1) At cabinet 27A2 and 27A3, select the rectifier to be cleaned.

(2) Operate STANDBY/ON switch, located on the front of the rectifier module, to the STANDBY position.

(3) Operate the AC circuit breaker, located below the rectifier module, to the OFF position.

(4) Operate the DC OUTPUT circuit breaker, located below the rectifier module, to the OFF position.

(5) Loosen the three rectifier module holding screws that secure the rectifier to the shelf.

(6) Using the rectifier module handle, remove the module from the rectifier shelf. Inspect the rectifier module for any unusual conditions.

(7) Using compressed air blow the dust out of the rectifier module. Inspect the rectifier module for any unusual conditions.

CAUTION: Before inserting the rectifier module into the shelf, ensure that the STANDBY/ON switch is on STANDBY, the AC INPUT circuit breaker is OFF, the DC OUTPUT circuit breaker is OFF, and the FLOAT/EQUAL switch is on FLOAT.

(8) Insert the rectifier module into the rectifier shelf. Secure the rectifier to the shelf with the three holding screws.

(9) Operate the AC INPUT circuit breaker to the ON position. The TEST LED will illuminate Amber and the GO LED will illuminate Green.

(10) Operate the STANDBY/ON switch to the ON position.

(11) **Press** and **hold** the CAP CHARGE push-button switch, located below the rectifier next to the DC OUTPUT circuit breaker, for five seconds, then operate the DC OUTPUT circuit breaker to the ON position. The TEST LED will extinguish. The rectifier is now in service.

(12) Operate the SELECT switch to the V position and verify proper voltage.

(13) Operate the SELECT switch to the A position and verify proper load sharing.

(14) Repeat this procedure for the remaining rectifiers in the system.

179. CLEAN INVERTER MODULES.

a. Object. To clean out the dust that accumulates in the inverters to ensure proper airflow for cooling.

b. Discussion. Each inverter will be removed, **one at a time**, to blow out the accumulated dust.

c. Test Equipment Required. Compressed air and a flat blade screwdriver.

d. Conditions. This procedure should be performed when the VTABS is the standby switch.

e. Detailed Procedure.

(1) At cabinet 27A3, select the inverter to be cleaned.

(2) At circuit breaker panel 27A3A5, locate the circuit breaker for the selected inverter. Operate the circuit breaker to the OFF position.

(3) Loosen the two inverter module holding screws (one top and one bottom) that secure the inverter to the shelf.

(4) Using the inverter module handle, remove the inverter from the shelf.

(5) Using compressed air blow the dust out of the inverter module. Inspect the inverter module for any unusual conditions.

CAUTION: Wait seven minutes after removal for the capacitors to discharge, before inserting the inverter into the shelf and operating the DC circuit breaker to the ON position.

(6) Ensure that the DC INPUT circuit breaker at 27A3A5, for the inverter module to be installed, is in the OFF position.

(7) Install the inverter module into the shelf. Secure the module to the shelf with the two holding screws (one top and one bottom).

(8) Operate the DC INPUT circuit breaker, for the module just installed, to the ON position. The ON LED will illuminate Green.

NOTE: There may be some temporary flashing of indicators and alarm chattering for one or two seconds until the system stabilizes. See steps nine and ten of this paragraph for clearing alarm conditions.

(9) If an alarm condition persists on the inverter module, press the RESET button (several times if necessary) located on the inverter module to clear the alarm.

(10) If an alarm condition persists on the system, press the RESET button, located on the redundant control card in 27A3A1, to clear the alarm.

(11) Repeat this procedure for the remaining inverters in the system.

180.–199. RESERVED.

Section 3. SPECIAL MAINTENANCE PROCEDURES

200. RUN PEM DIAGNOSTICS.

a. Object. To verify that the PEMs are operating error free.

b. Discussion. This procedure should be performed on the Backup Subsystem and Training Subsystem PEMs. For more information on diagnostics tests, refer to TI 6690.25, Section 11, VTABS Diagnostic Flow Charts, and Table 11–7, PEM Diagnostic Test Listing.

c. Test Equipment Required. None.

d. Conditions. This procedure must be coordinated with ATC and DYSIM training. The PEM under test must be OOS.

e. Detailed Procedure. Log onto a VTABS workstation and proceed as follows:

(1) Select the appropriate screen, for the PEM to be taken OOS.

(2) Right mouse click on the PEM under test.

(3) From the pop-up menu select Service.

(4) From the Service cascading submenu select Out Of Service.

(5) At the Service Change Verification window select Yes option button. The Service Change Verification window is removed and the Service Change Window is displayed with the following message:

Service Change Sent

(6) At the Service Change Window select the OK button. The Service Change window is removed and the PEM is transitioned to Out Of Service.

(7) Right mouse click on the PEM to be tested.

(8) From the pop-up menu select Diagnostics.

(9) From the Diagnostic Testing window, (under Description) select tests.

NOTE: To select all tests, select the first test, hold down the Shift key and select the last test, or click on the first test and drag the mouse pointer down to the last test.

(10) Select Start Tests button.

(11) Test results will be displayed in the Tests Results portion of the Diagnostic Testing window.

NOTE: Tests 8 through 11, 14, 15, and 27 will fail, when the PEM is switched to VSCS, due to the VCE being operational on VSCS. This is normal. When the PEM is switched to VTABS, they should pass.

(12) Perform the following for a printed copy of the test results. (Otherwise proceed to step 13 of this paragraph.)

(a) From the Diagnostic Testing window select the Report button. The Diagnostic Testing Results Report window is displayed behind the Diagnostic Testing window.

(b) Select the Close button to remove the Diagnostic Testing window and display the Diagnostic Testing Results Report window.

(c) From the Main Menu select Utilities.

(d) From the Utilities pull down submenu select Print.

(e) From the print window select OK. The report is sent to the printer and the Print window is removed.

(f) Click on menu bar at top left corner of screen and select Close to close the Diagnostics Testing Results Report window.

(13) When all tests have completed, select the Close button to remove the Diagnostic Testing window.

(14) Right mouse click on the PEM to be restarted. A Restart must be performed to ensure the PEM has valid code.

(15) From the pop-up menu select Restart, the Initiate.

(16) From the Initiate Restart Verification window select the Yes button.

(17) After the Restart is completed, right mouse click on the PEM to be returned to In Service.

(18) From the pop-up menu select Service, then In Service.

(19) At the Service Change Verification window select Yes option button. The Service Change Verification window is removed and the Service Change Window is displayed with the following message:

Service Change Sent

(20) At the Service Change Window select the OK button. The Service Change window is removed and the PEM is transitioned to In Service.

(21) Close all other windows opened by this procedure and return to the Summary Status screen.

201. MEASURE A/G VOICE TRANSMISSION PARAMETERS.

a. Object. To verify correct transmission parameters for A/G Radio Interface cards in the Backup Subsystem.

NOTE: A/G interfaces cards in the Training Subsystem are looped back in the switch and do not have test jacks on the IDF, and therefore will not be tested.

b. Discussion. The VTABS maintenance position can be used to perform this procedure. One TIMS will be used at the position and a second TIMS used at the VTABS IDF. If the interfaces do not appear at the maintenance position, perform a temp mod to place them there for testing.

c. Test Equipment Required. Two portable TIMS, test cords, VSCS DJM/BOB, Facilities Reference Data File (FRDF), TI 6690.25, Table 6–16, Backup Switch Subsystem Radio/Circuit Cross Reference.

d. Conditions. A/G radio interface cards must be In Service in order to perform this procedure. The resource for the A/G interface under test will have to be released by ATC, and transferred to VTABS at the associated CCA in the cutover switch.

CAUTION: At the MDS, insert a test cord in the TX jack of the A/G test frequency, before starting any testing, to prevent test tones from being transmitted.

e. Detailed Procedure.

(1) Open the CSS (8A1) cabinet doors. On the Master CPU (8A1A1, slot 1), enable the keyswitch by inserting the key and turning clockwise.

(2) On the associated A/G module, press transfer switch "B" to transfer the A/G frequency, under test, to VTABS. The "B" LED will illuminate Yellow.

(3) At the maintenance position PEM, power on the DJM/BOB and connect a test cord between the DJM jacks on the DJM/BOB and the position DJM.

(4) Power ON the TIMS and setup as follows:

LINE = 600 ohms (TX/RX),
TERM (BRDG off), 4W
SEND = 1004 Hz
LEVEL = −9 dBm
MEASURE = LVL FREQ

(5) Connect test cords between the TIMS TX and RX jacks and the TEST EQPT TX and RX jacks, respectfully, on the DJM/BOB.

(6) At the position select the A/G frequency to be measured. Push the PTT button on the DJM/BOB.

(7) At the VTABS IDF, power ON the TIMS and setup as follows:

LINE = 600 ohms (TX/RX),
TERM (BRDG off), 4W
SEND = 1004 Hz
LEVEL = −8 dBm
MEASURE = LVL FREQ

(8) Connect test cords between the TIMS TX and RX jacks and the EQPT IN and EQPT OUT jacks, respectfully, of the interface under test.

(9) Measure the circuit transmit level on the IDF TIMS.

(10) Release the PTT button on the DJM/BOB.

(11) Adjust the HS volume control on the associated VCE speaker module until the Nominal LED on the DJM/BOB illuminates, and the level on the position TIMS reads −25 dBm. This is a reference level.

(12) Reduce the TX level at the IDF TIMS until the position TIMS indicates a sudden 8 to 10 dB drop in power. Note the level on the IDF TIMS.

NOTE: With this data, the set point of the interface card under test can be determined. The set point is approximately +9 dB above the level which causes a sudden drop at the position TIMS.

EXAMPLE: A GRIM interface card is set for −8 dBm. A −8 dBm test level is injected at the IDF, and the position HS VOL is set to a reference level of −25 dBm on the position TIMS. As the level at the IDF TIMS is reduced, the level at the position TIMS does not change. When a −17.5 dBm at the IDF TIMS is reached, the level at the position TIMS suddenly drops 8−10 dB. A −17.5 dBm +9 dB equals a setting of −8.5 dBm, which is within .5 dB of the actual card setting, probably due to additional cable length, jacks, etc.

(13) Verify the level readings with the FRDF.

NOTE: This portion of the test will measure the minimum, maximum and nominal levels for AGC circuit input. Circuits will be tested with the portable TIMS set at the following values: the setpoint, setpoint +8 dB, and setpoint −8 dB.

(14) For LEVELS test, setup the position TIMS as follows:

LINE = 600 ohms (TX/RX)
TERM (BRDG off), 4W
SEND = QUIET
MEASURE = LVL/FREQ

(15) For LEVELS test, setup the IDF TIMS as follows:

LINE = 600 ohms (TX/RX)
TERM (BRDG off), 4W
SEND = specific test value (setpoint, setpoint +8 dB, and setpoint −8 dB, accordingly).

(16) Measure the RX levels at the position TIMS.

(17) Verify the readings with the FRDF.

(18) Repeat steps 15 and 16 of this paragraph until all three levels are tested.

(19) For BACKGROUND NOISE test setup the IDF TIMS as follows:

LINE = 600 ohms (TX/RX)
TERM (BRDG off), 4W
SEND = QUIET
MEASURE = NOISE
AUX = CMSG

(20) For BACKGROUND NOISE test setup the position TIMS as follows:

LINE = 600 ohms (TX/RX)
TERM (BRDG off), 4W
SEND = QUIET
MEASURE = NOISE
AUX = CMSG

(21) Measure the Background Noise level at both the position TIMS and the IDF TIMS.

(22) Verify the measured readings with the FRDF.

(23) Remove all test equipment and test cords.

(24) At the CSS, on the associated A/G module, press transfer switch "A" to transfer the A/G frequency, under test, to VSCS. The "A" LED will illuminate Red.

(25) On the Master CPU (8A1A1, slot 1), disable the keyswitch by turning the key counterclockwise. Remove the key and close the cabinet doors.

(26) Repeat this procedure for the remaining A/G interfaces cards in the system.

202. MEASURE FOUR−WIRE G/G VOICE TRANSMISSION PARAMETERS.

a. Object. To verify correct transmission parameters for four-wire G/G trunks in the Backup Subsystem.

NOTE: G/G interface cards in the Training Subsystem are looped back in the switch and do not have test jacks on the IDF, and therefore will not be tested.

b. Discussion. The VTABS maintenance position can be used to perform this procedure. One TIMS will be used at the position and a second TIMS used at the VTABS IDF. If the interfaces do not appear at the maintenance position, perform a temp mod to place them there for testing.

c. Test Equipment Required. Two portable TIMS, VSCS DJM/BOB, Test cords, FRDF, TI 6690.25, Table 6−17, Backup Switch Subsystem Trunk/Circuit Cross Reference — GO1 Configuration, (four-wire and six-wire), or Table 6−18, Backup Switch Subsystem Trunk/Circuit Cross Reference — GO2 Configuration, (four-wire).

d. Conditions. G/G trunk interface cards must be In Service for this procedure. This procedure is applicable only to four-wire trunks.

NOTE: Type 3 circuits, that are used for Central Flow Control, are tone-on-active circuits. When testing these circuits a 2600 Hz tone must be injected at the IDF EQPT IN jack to initiate an incoming call to VTABS. At the same time a 1004 Hz tone must be injected, at the IDF EQPT IN jack, to measure the circuit receive level at the position. Two TIMS will be required to inject both tones at the same time and will double terminate the circuit. This double termination will cause the levels at the position TIMS to be off by 3 dB.

e. Detailed Procedure.

(1) At the maintenance position, power ON the DJM/BOB and connect a test cord between the DJM jacks on the DJM/BOB and the position DJM.

(2) Power ON the position TIMS and setup as follows:

LINE = 600 ohms (TX/RX),
TERM (BRDG off), 4W
SEND = 1004 Hz
LEVEL = −9 dBm
MEASURE = LVL FREQ

(3) Connect test cords between the TIMS TX and RX jacks and the TEST EQPT TX and RX jacks, respectfully, on the DJM/BOB.

(4) At the position select the G/G trunk to be measured. Push the PTT button on the DJM/BOB.

(5) At the VTABS IDF, power ON the second TIMS and setup as follows:

LINE = 600 ohms (TX/RX),
TERM (BRDG off), 4W
SEND = 1004 Hz
LEVEL = −9 dBm
MEASURE = LVL FREQ

(6) Connect test cords between the IDF TIMS TX and RX jacks and the EQPT IN and EQPT OUT jacks, respectfully, of the interface under test.

(7) Measure the circuit transmit level on the IDF TIMS.

(8) Adjust the HS volume control on the associated VCE speaker module until the Nominal LED on the DJM/BOB illuminates, and the level on the position TIMS reads −25 dBm. This is a reference level.

(9) Reduce the TX level at the IDF TIMS until the Position TIMS indicates a sudden 8 to 10 dB drop in power. Note the level on the IDF TIMS.

NOTE: With this data, the set point of the interface card under test can be determined. The set point is approximately +9 dB above the level which causes a sudden drop at the position TIMS.

EXAMPLE: A G/G interface card is set for −9 dBm. A test tone is injected at the IDF at a −9 dBm, and the position HS VOL is set to a reference level of −25 dBm on the position TIMS. As the level at the IDF TIMS is reduced, the level at the position TIMS does not change. When −18.5 dBm at the IDF TIMS is reached, the level at the position TIMS suddenly drops 8−10 dB. A −18.5 dBm +9 dB equals a setting of −9.5 dBm, which is within .5 dB of the actual card setting, probably due to additional cable length, jacks, etc.

(10) Verify the measured level with the FRDF.

NOTE: This portion of the test will measure the minimum, maximum and nominal levels for AGC circuit input. Circuits will be tested with the IDF TIMS set at the following values: setpoint, setpoint +8 dB, and setpoint −8 dB.

(11) For LEVELS test, setup the position TIMS as follows:

LINE = 600 ohms (TX/RX)
TERM (BRDG off), 4W
SEND = QUIET
MEASURE = LVL/FREQ

(12) For LEVELS test, setup the IDF TIMS as follows:

LINE = 600 ohms (TX/RX)
TERM (BRDG off), 4W
SEND = specific test value (setpoint, setpoint +8 dB and setpoint −8 dB, accordingly).

(13) Measure the RX levels at the position TIMS.

(14) Verify the readings with the FRDF.

(15) Repeat steps 12 and 13 of this paragraph until all three levels are tested.

(16) For BACKGROUND NOISE test, setup the IDF TIMS as follows:

LINE = 600 ohms (TX/RX)
TERM (BRDG off), 4W
SEND = QUIET
MEASURE = NOISE
AUX = CMSG

(17) For BACKGROUND NOISE test, setup the position TIMS as follows:

LINE = 600 ohms (TX/RX)
TERM (BRDG off), 4W
SEND = QUIET
MEASURE = NOISE
AUX = CMSG

(18) Measure the Background Noise level at both the position TIMS and the IDF TIMS.

(19) Verify the measured readings with the FRDF.

(20) Repeat this procedure for the remaining G/G interfaces cards in the system.

203. MEASURE TWO-WIRE G/G VOICE TRANSMISSION PARAMETERS.

a. Object. To verify correct transmission parameters for two-wire G/G trunks in the Backup Subsystem.

b. Discussion. The VTABS maintenance position can be used to perform this procedure. One TIMS will be used at the position and a second TIMS used at the VTABS IDF. If the interfaces do not appear at the maintenance position, perform a temp mod to place them there for testing.

c. Test Equipment Required. Two portable TIMS, VSCS DJM/BOB, Test cords, FRDF, TI 6690.25, Table 6-17, Backup Switch Subsystem Trunk/Circuit Cross Reference — GO1 Configuration, (four-wire and six-wire), or Table 6-18, Backup Switch Subsystem Trunk/Circuit Cross Reference — GO2 Configuration, (four-wire).

d. Conditions. G/G trunk interface cards must be In Service for this procedure. When testing two-wire trunks, transmit and receive levels both appear on the same jack. The jack is site specific (EQ IN or EQ OUT).

NOTE: Perform tests in only one direction at a time.

(1) For Type 3-LSO and Type 8, which use Tellabs 6131A modules , it is necessary to set the IDF TIMS to TX/2W OFF HOOK, TERM (BRDG off), and QUIET. Once set, the 6131A BUSY LED will be illuminated. If the 6131A is not busy, audio will not pass through the module.

(2) When testing Type 3 LSS, and Type 6, which uses the Tellabs 6131B module, it is necessary to set the IDF TIMS to TX/2W OFF HOOK. The OFF HOOK is not required to test Type 3 LSS and Type 6 circuits, although these circuits can be tested with OFF HOOK selected. Since it will not affect the test, this procedure is written to include OFF HOOK as a generic test setup for simplicity.

e. Detailed Procedure.

(1) At the maintenance position, power ON the DJM/BOB and connect a test cord between the DJM jacks on the DJM/BOB and the position DJM.

(2) Power ON the position TIMS and setup as follows:

LINE = 600 ohms (TX/RX)
TERM (BRDG off), 4W
MEASURE = LVL/FREQ
SEND = 1004 Hz
LEVEL = -9 dBm

NOTE: The Ameritec TIMS (position) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key

(b) Function — 2 Enable Key

(c) Function — 8 Enable Key

(d) Function — #/+/- Enable Key

(e) Function — C Enable Key

(f) Measure Function Row Key

(g) Send Function Row Enable Key

(h) Function — 2 Enable Key

(i) Function — D Enable Key

(j) Function — #/+/– Enable Key

(k) Function — 9 Enable Key

(l) Function — D Enable Key

(m) Function — D Enable Key

(3) Connect test cords between the position TIMS TX and RX jacks and the TEST EQPT TX and RX jacks, respectfully, on the DJM/BOB.

(4) At the position select the G/G trunk to be measured. Push the PTT button on the DJM/BOB.

(5) At the VTABS IDF, setup the second TIMS as follows:

LINE = 600 ohms (TX/RX)
OFF HK for TX/2W
TERM (BRDG off), 2W
SEND = QUIET
MEASURE = LVL/FREQ

NOTE: The Ameritec TIMS (IDF) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key

(b) Function — 2 Enable Key

(c) Function — 8 Enable Key

(d) Function — 5 Enable Key

(e) Function — #/+/– Enable Key

(f) Function — B Enable Key

(g) Send Function Row Enable Key

(h) Function — 1 Enable Key

(i) Measure Function Row Key

(j) Function — 1 Enable Key

(6) Connect a test cord from the IDF TIMS TX/2W jack to EQ IN or EQ OUT jack (site specific) of the interface under test.

(7) Measure the TX level on the IDF TIMS.

(8) Verify the measured level with the FRDF.

NOTE: For two-wire circuits, the check must be done in the reverse direction to complete the test. **DO NOT** remove the test cord connected between the IDF TIMS TX jack and the EQ IN or EQ OUT jack of the interface under test.

(9) At the VTABS IDF, setup the TIMS as follows:

LINE = 600 ohms (TX/RX)
OFF HK for TX/2W
TERM (BRDG off), 2W
MEASURE = LVL/FREQ
SEND = –9 dBm

NOTE: The Ameritec TIMS (IDF) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key

(b) Function — 2 Enable Key

(c) Function — 8 Enable Key

(d) Function — 5 Enable Key

(e) Function — #/+/– Enable Key

(f) Function — B Enable Key

(g) Measure Function Row Key

(h) Function — 1 Enable Key

(i) Send Function Row Enable Key

(j) Function — 2 Enable Key

(k) Function — D Enable Key

(l) Function — #/+/– Enable Key

(m) Function — 9 Enable Key

(n) Function — D Enable Key

(o) Function — D Enable Key

(10) Set the position TIMS as follows:

LINE = 600 ohms (TX/RX)
TERM (BRDG off), 4W
SEND = QUIET
MEASURE = LVL/FREQ

NOTE: The Ameritec TIMS (position) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key

(b) Function — 2 Enable Key

(c) Function — 8 Enable Key

(d) Function — #/+/– Enable Key

(e) Function — C Enable Key

(f) Send Function Row Enable Key

(g) Function — 1 Enable Key

(h) Measure Function Row Key

(i) Function — 1 Enable Key

(11) Adjust the HS volume control on the associated VCE speaker module until the Nominal LED on the DJM/BOB illuminates, and the level on the position TIMS reads –25 dBm. This is a reference level.

(12) Reduce the TX level at the IDF TIMS until the position TIMS indicates a sudden 8 to 10 dB drop in power. Note the level on the IDF TIMS.

NOTE: With this data, the set point of the interface card under test can be determined. The set point is approximately +9 dB above the level which causes a sudden drop at the position TIMS.

EXAMPLE: A G/G interface card is set for –9 dBm. A test tone is injected at the IDF at a –9 dBm, and the position HS VOL is set to a reference level of –25 dBm on the position TIMS. As the level at the IDF TIMS is reduced, the level at the position TIMS does not change. When –18.5 dBm at the IDF TIMS is reached, the level at the position TIMS suddenly drops 8–10 dB. A –18.5 dBm +9 dB equals a setting of –9.5 dBm, which is within .5 dB of the actual card setting,, probably due to additional cable length, jacks, etc.

(13) Verify the measured level with the FRDF.

NOTE: This portion of the test will measure the minimum, maximum and nominal levels for AGC circuit input. Circuits will be tested with the IDF TIMS set at the following values: setpoint, setpoint +8 dB, and setpoint –8 dB.

(14) For LEVELS test, setup the position TIMS as follows:

LINE = 600 ohms (TX/RX)
TERM (BRDG off), 4W
SEND = QUIET
MEASURE = LVL/FREQ

NOTE: The Ameritec TIMS (position) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key

(b) Function — 2 Enable Key

(c) Function — 8 Enable Key

(d) Function — #/+/– Enable Key

(e) Function — C Enable Key

(f) Send Function Row Enable Key

(g) Function — 1 Enable Key

(h) Measure Function Row Key

(i) Function — 1 Enable Key

(15) For LEVELS test, set the VTABS IDF TIMS as follows:

LINE = 600 ohms (TX/RX)
OFF HK for TX/2W
TERM (BRDG off), 2W
SEND = specific test value (setpoint, setpoint +8 dB and setpoint –8 dB, accordingly).

NOTE: The Ameritec TIMS (IDF) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key

(b) Function — 2 Enable Key

(c) Function — 8 Enable Key

(d) Function — 5 Enable Key

(e) Function — #/+/– Enable Key

(f) Function — B Enable Key

(g) Send Function Row Enable Key

(h) Function — 2 Enable Key

(i) Function — D Enable Key

(j) Function — #/+/– Enable Key

(k) Function — [specific test value] Enable Key

(l) Function — D Enable Key

(m) Function — D Enable Key

(16) Measure the RX levels at the position TIMS.

(17) Verify the readings with the FRDF.

(18) Repeat steps 15 and 16 of this paragraph until all three levels are tested.

(19) For BACKGROUND NOISE test set the VTABS IDF TIMS as follows:

LINE = 600 ohms (TX/RX)
OFF HK for TX/2W
TERM (BRDG off), 2W
SEND = QUIET
MEASURE = NOISE
AUX = CMSG

NOTE: The Ameritec TIMS (IDF) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key

(b) Function — 2 Enable Key

(c) Function — 8 Enable Key

(d) Function — 5 Enable Key

(e) Function — #/+/– Enable Key

(f) Function — B Enable Key

(g) Send Function Row Enable Key

(h) Function — 1 Enable Key

(i) Measure Function Row Key

(j) Function — 2 Enable Key

(k) Aux Function Row Enable Key

(l) Function — 2 Enable Key

(20) For BACKGROUND NOISE test set the position TIMS as follows:

LINE = 600 ohms (TX/RX)
TERM (BRDG off), 4W
SEND = QUIET
MEASURE = NOISE
AUX = CMSG

NOTE: The Ameritec TIMS (position) is set to the above parameters by pressing the front panel buttons in the following sequence:

(a) Line Function Row Enable Key

(b) Function — 2 Enable Key

(c) Function — 8 Enable Key

(d) Function — #/+/– Enable Key

(e) Function — C Enable Key

(f) Send Function Row Enable Key

(g) Function — 1 Enable Key

(h) Measure Function Row Key

(i) Function — 2 Enable Key

(j) Aux Function Row Enable Key

(k) Function — 2 Enable Key

(21) Measure the Background Noise level at both the position TIMS and the IDF TIMS.

(22) Verify the measured readings with the FRDF.

(23) When testing of this G/G interface circuit is completed, repeat this procedure for the remaining two-wire G/G interfaces.

204.–209. RESERVED.

CHAPTER 6. GLOSSARY OF ACRONYMS AND TERMS

210. GLOSSARY.

A glossary of acronyms, terms, and signals is provided in the following paragraphs.

List of Acronyms. The acronyms used in this manual are as follows:

ac	Alternating Current
AF	Airway Facility
AFI	Automated Fault Isolation
A/G	Air-to-Ground
AGC	Automatic Gain Control
AMIC	Area Manager In Charge
ANSI	American National Standards Institute
AOP	NAS Operations
AOS	Operational Support
ARTCC	Air Route Traffic Control Center
ASCII	American Standard Code for Information Interchange
AT	Air Traffic
ATC	Air Traffic Control
ATO	Air Traffic Operations
AUI	Attachment Unit Interface
BIT	Built-in Test
BIT/AFI	Built-in-Test/Automated Fault Isolation
BNC	Baby N Connector
BNC	British Naval Connector
BNC	Bayonet-Neill-Concelman
BOB	Break Out Box
BPS	Bits Per Second
BUEC	Backup Emergency Communication
CCA	Circuit Card Assembly
CE	Common Equipment
CHI	Computer Human Interface
CHKDSK	Check Disk
CPU	Central Processing Unit
CS	Control Subsystem
CSS	Cutover Switch Subsystem
DA	Direct Access
DAT	Digital Audio Tape
db	decibels
dBm	decibels (in reference to one milliwatt)
dBrnc	decibels (above the relative noise c-weighted channel)
dc	Direct Current
DDD	Direct Distance Dialed
DDS	Digital Data Storage
DEO	Data Entry Operator
DJM	Dual Jack Module
DLU	Digital Line Unit
DOS	Disk Operating System
DSR	Display System Replacement
DYSIM	Dynamic Simulation
ESD	Electrostatic Discharge
FAA	Federal Aviation Administration
FRDF	Facilities Reference Data File

G/G	Ground-to-Ground
GRIM	Grim Corporation Equipment
HS	Headset/Handset
HSP	High Speed Printer
HV	High Voltage
Hz	Hertz
IA	Indirect Access
IC	Intercom
IDF	Intermediate Distribution Frame
IEEE	Institute of Electrical and Electronic Engineers
IP	Interphone
LAN	Local Area Network
LE	Logical Entity
LED	Light Emitting Diode
LRU	Line Replaceable Unit
LS	Loudspeaker
LS/MON	Loudspeaker/Monitor
LSO	Loop Start Office
LSS	Loop Start Station
LU	Logical Unit
LV	Low Voltage
MDS	Master Demarcation System
MIDS	Master Instructor, DEO, and Supervisor
MJ	Major
MMS	Maintenance Management System
MN	Minor
MPES	Maintenance Position Equipment Subsystem
M/S	Main/Standby
MTTR	Mean-Time-To-Repair
NAPRS	National Airspace Performance Reporting System
NAS	National Airspace System
NCP	National Change Proposal
NOM	NAS Operations Manager
NSN	National Stock Number
OOS	Out Of Service
OVR	Override
PABX	Private Automatic Branch Exchange
PEM	Position Electronics Module
PM	Preventative Maintenance
P/O	Part Of
PTT	Push-to-Talk
RD	Ringdown
RDNS	Ringdown No Supervision
RFA	Rectifier Fail Alarm
RX	Receive
SAD	Site Adaptation Data
SCSI	Small Computer System Interface
SF	Single Frequency
SMC	System Monitor and Control
SMO	System Maintenance Operator
SQB	Squelch Break
SQL	Structured Query Language
SS1/SS4	Selective Signaling
TED	Touch Entry Device
TIMS	Transmission Impairment Measurement Set
TRACON	Terminal Radar Approach Control
TX	Transmit
UHF	Ultra High Frequency

UPS	Uninterruptable Power Supply
V	Volt
V ac	Volts Alternating Current
VCE	VSCS Console Equipment
V dc	Volts Direct Current
VDM	VSCS Display Module
VEM	VSCS Electronics Module
VF	Voice Frequency
VFSS	Voice Frequency Signaling System
VHF	Very High Frequency
VIK	VSCS Indirect Access Keypad
VOM	Volt Ohm Meter
VOX	Voice Operated Detection
VSCS	Voice Switching and Control System
VSOM	VTABS System Operation and Maintenance
VTABS	VSCS Training and Backup Switch

211.–219. RESERVED.

CASE FILE/ NAS CHANGE PROPOSAL (Please type or print neatly)	For CM Use	Case File Received Date	NCP Issuance Date	NCP Number	Page 1 of ___

1. Case File Number

2. Prescreening Office ☐ ASM- ☐ ASE-500 ☐ AFE-100 ☐ _____ ☐ ATR- ☐ ANS-200 ☐ APM-100

3. Scope of Change ☐ Local ☐ National ☐ Test ☐ CIP

4. Program Element ☐ Air Traffic Control ☐ Interfacility Comm ☐ _____ ☐ Ground-to-Air ☐ Maint & Opns Support

5. Life-Cycle Baseline ☐ Requirements Determination ☐ Operational

Acquisition: ☐ Functional ☐ Design ☐ Allocated ☐ Product

6. Priority ☐ Normal ☐ Time-Critical ☐ Urgent

7. Supplemental Change Form ☐ ECR/ECP ☐ TES ☐ _____

7a. Supplemental Change No. _____

7b. Supplemental Change Initiation Date _____

8. Case File Originator	9. Originator's Organization	10. Telephone Number	11. Case File Initiation Date

12. Baseline Document Type ☐ CPFS ☐ SPEC ☐ MTBK ☐ _____ ☐ TI ☐ DWG ☐ IRD/ICT

13. Baseline Document Number(s)

14. CI Subsystem Designator	15. FA Type	16. CI Component Designator

17. Facility Identifier (FACID)	18. Facility Code (FACCODE)	19. Cost Center Code	20. Software System Version

21. Title (as descriptive as possible including location and runway number if applicable)

22. Description: (a) identification of problem, (b) proposed change, (c) interface impact, (d) cost, (e) benefits, (f) schedule, (g) justification of time-critical/urgent status

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FAA Form 1800-2 (11-90) — Supersedes Previous Edition

Case File Number	NCP Number	Page 2 of ___

23. Name and Title of Originator's Immediate Supervisor (Type/Print Clearly)	Signature	Date

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Name	Routing Symbol	Date	Concur	Non-Concur

Routing Symbol	Signature
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24a. Comments

(Attach additional sheets if necessary)

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Date	

Routing Symbol	Signature
Date	

Routing Symbol	Signature/Configuration Mgr/NCP Coordinator/ Reg Exec Sec
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25a. Comments

(Attach additional sheets if necessary)

26. Prescreening Review Organization Comment

(Attach additional sheets if necessary

Reviewers	Routing Symbol	Date	Concur	Non-Concur

Recommended Must Evaluators

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27. Configuration Management Use Only

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☐ Allocated ☐ Product

6. Priority
☐ Normal
☐ Time-Critical
☐ Urgent

7. Supplemental Change Form
☐ ECR/ECP ☐ TES ☐ _____
7a. Supplemental Change No. _____
7b. Supplemental Change Initiation Date _____

8. Case File Originator	9. Originator's Organization	10. Telephone Number	11. Case File Initiation Date

12. Baseline Document Type ☐ CPFS ☐ SPEC ☐ MTBK ☐ _____ ☐ TI ☐ DWG ☐ IRD/ICT

13. Baseline Document Number(s)

14. CI Subsystem Designator	15. FA Type	16. CI Component Designator

17. Facility Identifier (FACID)	18. Facility Code (FACCODE)	19. Cost Center Code	20. Software System Version

21. Title (as descriptive as possible including location and runway number if applicable)

22. Description: (a) identification of problem, (b) proposed change, (c) interface impact, (d) cost, (e) benefits, (f) schedule, (g) justification of time-critical/urgent status

Blocks 1 through 22 are to be completed by originator and/or the NCP coordinator. If a block is not applicable, write N/A. Attach additional sheets if necessary. See current revision of NAS-MD-001 for detailed completion instructions.

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Case File Number	NCP Number	Page 2 of ___

23. Name and Title of Originator's Immediate Supervisor (Type/Print Clearly)	Signature	Date

24. Facility/Sector Review (AT/AF)

Name	Routing Symbol	Date	Concur	Non-Concur

Routing Symbol	Signature
Date	
Routing Symbol	Signature
Date	

24a. Comments

(Attach additional sheets if necessary)

25. Regional Review (AT/AF/FS/AS)

Name	Routing Symbol	Date	Concur	Non-Concur

☐ Recommend Approval (Enter into CM/STAT. Forward to Prescreening) ☐ Disapprove (Return to Originator)

Routing Symbol	Signature
Date	
Routing Symbol	Signature
Date	
Routing Symbol	Signature/Configuration Mgr/NCP Coordinator/ Reg Exec Sec
Date	

25a. Comments

(Attach additional sheets if necessary)

26. Prescreening Review Organization Comment

(Attach additional sheets if necessary

Reviewers	Routing Symbol	Date	Concur	Non-Concur

☐ Recommend Approval ☐ Recommend Disapproval (Return original to originating office through the Regional NCP Coordinator)

Routing Symbol	Signature
Date	

Recommended Must Evaluators

27. Configuration Management Use Only